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ABSTRACT

The Learning Outcomes Study, a 2-year investigation, evaluated four popular types of grouping arrangements for gifted students in grades 2 and 3 in 14 collaborative school districts in 10 states. The study compared within-class, pull-out, separate class, and special school instructional arrangements. Study participants (N=1000) included students who had either just entered gifted programs, were high ability students not in special programs, or were nongifted students. Analyses focused on assessments of achievement, attitudes toward learning processes, self-perception, intrinsic/extrinsic motivation, student activities, behavioral adjustment, and teacher ratings of learning, motivation, and creativity. In terms of achievement, gifted children attending special programs performed better than gifted peers not in programs. Students from the gifted comparison group, or in within-class or pull-out programs had higher perceptions of their scholastic abilities than did children in separate class or special school programs. No differences by program type or ethnic status were found for social acceptance. Also, no significant differences appeared either across groups or according to racial/ethnic status regarding internal versus external criteria for success/failure. Students in the separate class and special school programs scored the lowest on the "preference for challenge" scale, but had the highest levels of achievement in a traditionally more academic environment. Students in special schools had the highest scores regarding attitudes toward learning. Results suggest that no single program fully addresses all the psychological and emotional needs of students. Extensive appendices provide detailed methodological and analytical information on the study. Twenty-seven tables and five figures also detail study findings. Executive Summary is also published separately. (Contains approximately 140 references.) (DB)

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THE NATIONAL RESEARCH CENTER ON THE GIFTED AND TALENTED

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Evaluation of the Effects of Programming Arrangements on Student Learning Outcomes

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ABSTRACT

This study represents the first major attempt at the national level to assess the effects of programs for the gifted and talented on learning outcomes for elementary school students. The Learning Outcomes Study at the University of Virginia was a two-year investigation of over 1,000 elementary school children in grades 2 and 3. Fourteen Collaborative School Districts (CSD) in 10 states participated in the study. Academic and affective development were evaluated within four popular types of grouping arrangements: Within-Class, Pull-Out, Separate Class, and Special School. Study participants had either just entered gifted programs, were high ability students who did not attend special programs, or were nongifted students. The sample included students from urban, suburban, and rural environments as well as individuals representing underserved populations.

Data collection sources included students, teachers, and parents. Analyses focused on assessments of achievement, attitudes toward learning processes, self-perception, intrinsic/extrinsic motivation, student activities, behavioral adjustment, and teacher ratings of learning, motivation, and creativity. Data were collected in the fall and spring of the 1990-1991 academic year and at the beginning and end of the following academic year. This project addressed three major research questions: (a) Are there significant differences between program types (strategies)? (b) Do any of the program types have differential effects on underserved students? (c) Are there differential effects in achievement for underserved students after the summer break (spring 1991 and fall 1991)? The primary research questions were examined using analysis of covariance procedures, after controlling for initial differences in performance and socioeconomic status. The independent variables were program type (four levels representing participation in one of the programs for the gifted, two comparison groups) and racial/ethnic status. The dependent variables were each of the outcome variables.

In terms of achievement, gifted children attending special programs performed better than their gifted peers not in programs. Specifically, children in Special Schools, Separate Class programs, and Pull-Out programs for the gifted showed substantially higher levels of achievement than both their gifted peers not in programs and those attending Within-Class programs. Students from the Gifted Comparison Group, Pull-Out program, and Within-Class model had higher perceptions of their scholastic abilities than children from the Separate Class and the Special School Programs. This result clearly supports research in the area of social comparison theory. As far as measures of affect were concerned, there were no differences by program type or ethnic status with respect to Social Acceptance. Likewise, no significant differences appeared either across groups or according to racial/ethnic status regarding internal vs. external criteria for success/failure.

Students from Within-Class and Special School programs felt more capable than nongifted students in making judgments about what to do in school. Students from Separate Class programs were the most reliant on teacher guidance for completing assignments and solving problems. The programs with the lowest scores on the Preference for Challenge scale were the ones with the highest levels of achievement in a traditionally more academic environment, the Separate Class and Special School programs. Perhaps this outcome is due to the quantity and quality of the tasks assigned to students in different types of programs. These results are discussed relative to outcome expectations about task difficulty, student motivation and self-perception, as well as comparisons students make within and between groups.

Regarding attitudes toward learning, students in Special Schools had the highest scores. This means that they were the most likely to perceive the classroom as a student-centered environment. The most striking pattern among the data from the teacher ratings was the significantly lower scores for students in Special Schools as compared to students in all other types of programs. These results lead to a conclusion that no single program fully addresses all the psychological and emotional needs of students.

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EXECUTIVE SUMMARY

Statement of the Problem

Recent school budget crises and philosophical debates about student grouping practices have caused many teachers, parents, and administrators to ask about the impact of programs on children identified as gifted and talented. How do different types of programs affect self-concept, motivation, and achievement? What impact do these programs have on nongifted students? A review of the literature on the effects of gifted programs was conducted, revealing that in the past 20 years only 10 studies were published describing the systematic effects of a gifted program over time (Cornell, Delcourt, Bland, Goldberg, 1990). None of these studies investigates academic and affective outcomes across multiple program types.

Purpose of the Research Study and Research Questions

The purposes of this research were threefold: (a) to examine the impact of the specific methods of grouping gifted and talented students within classrooms and schools; (b) to contribute to the improvement of program evaluation practices by investigating both academic and affective outcomes; and (c) to examine program effects on underserved students. The goals were achieved by comparing the learning outcome effects of four standard program strategies for teaching gifted and talented students: (a) Within-Class programs; (b) Pull-Out programs; (c) Separate Class programs; and (d) Special School programs. Specific emphasis was given to learning outcome effects on underserved students, such as African-American children in programs for the gifted.

Learning outcomes were broadly defined to include both academic and affective effects of participating in a gifted and talented program. For purposes of this study, academic effects included performance on standard achievement tests, teacher ratings of student learning behaviors, and student attitudes toward learning processes. Affective outcomes were student self-perception, intrinsic/extrinsic motivation, and behavioral adjustment. Behavioral adjustment was viewed as the degree to which a student had a behavioral problem.

The proposed multi-site, longitudinal study investigated learning outcomes at four stages. A sample of 1,010 second and third grade students were assessed at the time of entrance into one of the four types of programs in the fall of 1990, at the end of their first school year in the program, and at the beginning and end of the 1991-1992 academic year. Students were compared to two control groups, one of comparable students who attended

schools that did not provide services for gifted and talented students at the targeted grade levels, and a group of nongifted peers attending classrooms with the gifted participants. Program effects on Caucasian and African-American students were investigated.

Results of this project addressed three major research questions: (a) Are there significant differences between program types (strategies)? (b) Do any of the program types have differential effects on underserved students? (c) Are there differential effects in achievement for underserved students after the summer break (spring 1991 and fall 1991)?

Significance

The purpose of this study was not to ascertain which program was "best," but to improve our understanding of the effects of gifted programs on student academic and affective outcomes. Decisions about which type of program to institute require a cost-benefits analysis that involves factors beyond the scope of this study. A school district must consider available financial and human resources, as well as make value judgments about its goals for gifted and talented students. Beyond these factors, this study provided valuable information on student learning outcomes that can be used to guide rational decision-making in choosing among the various types of gifted programs.

These were the strengths of this study: (a) the design was prospective and longitudinal; (b) the comparative effects of four types of programs were investigated; (c) affective as well as academic learning outcomes were assessed; (d) differential effects on traditionally underserved students were examined.

Sample

This study represents the first major attempt at the national level to assess the effects of programs for the gifted and talented on learning outcomes for elementary school students. The Learning Outcomes Study at the University of Virginia was a two-year investigation of 1,010 elementary school children in grades 2 and 3. Fourteen Collaborative School Districts (CSD) in 10 states participated in the study. Academic and affective development were evaluated within four popular types of grouping arrangements: Within-Class, Pull-Out, Separate Class, and Special School. Study participants had either just entered gifted programs, were high ability students who did not attend special programs, or were nongifted students. The sample included students from urban, suburban, and rural environments. Individuals representing underserved populations such as African-Americans, were also represented.

There were three examples of Special School programs, Separate Class programs, and districts without programs, as well as four examples of Pull-Out programs and Within-Class programs. One school supplied students from two types of programs and another school provided representation from three program types. A total of 83 schools participated in this project. All gifted programs focused on an academically oriented curriculum in contrast to one stressing only a particular talent area. Students from Special Schools were homogeneously grouped on a full-time basis in schools designated for the gifted and talented. Those in Separate Classes received their instruction in homogeneous groups for all content-area courses and were housed in schools with students not identified as gifted and talented. Students participating in Pull-Out programs attended a resource room for two hours each week (range of 120 to 125 minutes per week) with curriculum based on interdisciplinary units and independent study. For districts with the Pull-Out model, none of the program documentation plans explicitly states that integration with

regular classroom activities is a goal of the gifted program, however, conversations with district coordinators of the gifted and talented reveal that this is a sought after result. Those from Within-Class programs attended heterogeneously grouped classes 100% of the time where differentiation of the curriculum was achieved in a variety of ways such as cluster grouping (implemented in one of the districts), independent study, as well as creative and affective enrichment activities. All programs had goals pertaining to both academic and affective outcomes. Their instructional techniques were tailored to the needs of high ability learners.

Students in the Gifted Comparison Group were selected for the project by teacher nomination, largely based on performance in reading and mathematics. While these criteria were not as comprehensive as the identification procedures used to select the gifted program students participating in the study, the school administrators selected students for the gifted comparison group with the intention of targeting them for inclusion in their gifted programs at a later date. The Nongifted Comparison Group was composed of average to above average ability students. Thus, the students performing below average or those with learning difficulties were not participants in the study.

All districts with programs for the gifted require that teachers have specialized training in the characteristics and needs of gifted learners. Nine out of 11 districts with programs for the gifted, encourage their staff to complete graduate courses on topics such as creativity, characteristics of the gifted, thinking skills, and early childhood development of the gifted. All districts state that they provide ongoing staff development for teachers who work in their programs for gifted students.

Procedure and Instrumentation

Data collection sources included students, teachers, and parents. Analyses focused on assessments of achievement, attitudes toward learning processes, self-perception, intrinsic/extrinsic motivation, student activities, behavioral adjustment, and teacher ratings of learning, motivation, and creativity. Instruments included the Iowa Tests of Basic Skills (Mathematics Concepts, Mathematics Problem Solving, Reading Comprehension, Science, and Social Studies) (Hieronymus, Hoover, & Lindquist, 1986), Arlin-Hills Attitudes Surveys: Attitudes Toward Learning Processes (Arlin, 1976), Self-Perception Profile for Children (Scholastic Competence and Social Acceptance) (Harter, 1985), Intrinsic Versus Extrinsic Orientation in the Classroom (Internal Criteria for Success/Failure, Independent Judgment, Independent Mastery, Preference for Challenge) (Harter, 1980), Student Activities Survey (NRC/GT Staff), the Child Behavior Checklist (Achenbach & Edelbrock, 1983, 1986), and the Scale for Rating Behavioral Characteristics of Superior Students (Creativity, Learning, and Motivation) (Renzulli, Smith, White, Callahan, & Hartman, 1976).

Data were collected in the fall and spring of the 1990-1991 academic year and during the fall and spring of the 1991-1992 academic year. Initial investigations examined the reliability (Delcourt, Loyd, Bland, Moon, & Perie, 1993) and validity (Goldberg, 1994) of selected measures for gifted students. This was followed by an analysis of these cognitive and affective variables across program groups. Additionally, researchers investigated differences in achievement according to program type and racial/ethnic status before and after the summer break of 1991.

Analyses

Data were cleaned and coded using standard procedures. The primary research questions were examined using analysis of covariance procedures, controlling for initial differences in performance and socioeconomic status. The independent variables were program type (four levels representing participation in one of the programs for the gifted, two comparison groups) and racial/ethnic status. The dependent variables were each of the outcome variables.

Results and Discussion

Research Question #1: Are there significant differences between program types (strategies)?

Eleven ANCOVA procedures were completed, one for each outcome variable (5 achievement subtests, 2 self-perception inventories, and 4 motivation scales). After controlling for social status and initial differences in first round scores, significant differences were found in academic achievement and affect across the four types of programs for gifted students. In addition, not one of the program types showed significant increases for all academic and affective outcomes. Follow-up analyses were conducted using Student-Newman-Keuls procedures for comparisons of means. Results indicated that students in Special Schools, Separate Class programs, and Pull-Out programs showed higher levels of achievement than students from Within-Class programs. African-American students had significantly lower levels of achievement than Caucasian students. There were no significant differences across program type or ethnic status for Social Acceptance, the degree to which children felt comfortable with their friends. Students from Pull-Out and Within-Class programs felt more capable in their academics, preferred more challenges in the classroom, and were more likely to want to work independently than their peers in Separate Class programs. A discussion follows in the section "Cognitive and Affective Learning Outcomes."

Research Question #2: Do any of the program types have differential effects on underserved students?

The main analyses included eleven ANCOVAs (5 achievement subtests, 2 self-perception inventories, and 4 motivation scales). Procedures examined the main effects of program type and racial/ethnic status and statistically controlled for initial differences in performance as well as social status. There were no first-order interactions for program type and racial/ethnic status for any of the examined variables. In other words, program type did not have any differential effects on underserved students (African-Americans). There were, however, main effects for racial/ethnic status with respect to all areas of achievement. Follow-up analyses were conducted using Student-Newman-Keuls procedures for comparisons of means. ANCOVAs were performed for three other variables, attitudes toward learning, teacher ratings, and behavioral adjustment. These results as well as a discussion of all findings can be found in the following section.

Cognitive and Affective Learning Outcomes

Achievement. In a study of student entry characteristics (Cornell, Delcourt, Goldberg, & Bland, 1992), results indicated that overall, students in Special School and Separate Classroom programs scored significantly higher than gifted students in other program options. These initial analyses were calculated using multivariate analyses of

covariance after controlling for grade level and racial/ethnic status. According to the results of the present report, after adjusting for differences in first round scores and social status, students in Pull-Out, Separate Class, and Special School programs showed higher achievement than gifted students who were not in programs and, in most cases, those from Within-Class programs and nongifted students. Why might this be the case? Why do students in three of the program types have higher scores than other students? Part of the answer may be found in the degree of agreement between the content of the program and the assessment instrument. Across all sites, programs were selected for the study because a major curricular focus was placed on academic progress rather than on another area such as artistic or creative development. With Special School and Separate Class programs traditionally emphasizing academics, it is important to note that the Pull-Out programs in this study also had a strong academic orientation. For example, within all four of the Pull-Out programs, the curriculum consisted of academic units not found in the regular school program, with many topics relating to science (e.g., tropical rain forests, land formations, weather patterns). Students in these programs were also encouraged to pursue their own investigations. Although a limited amount of time was spent in the resource room (approximately 2 hours/week), the emphasis on academics within the Pull-Out model appears to have contributed to the achievement level of these students, with outcomes similar to those for Special Schools and Separate Class programs. This was not the case for the Within-Class programs. Apparently students from the Within-Class programs do not attain levels of achievement as high as the students in the other program types, perhaps because of a lesser focus on academic skills.

In the areas of Reading Comprehension, Science, and Social Studies, students from the Special School, Separate Class, and Pull-Out programs had the highest achievement scores, often significantly higher than their peers from the Within-Class program and both of the comparison groups. The mathematics subtests provided different results. The nongifted children performed significantly better in Mathematics Concepts and Mathematics Problem Solving than the children from the Gifted Comparison Group and the gifted children participating in the Within-Class programs. This may mean that these gifted students were not originally selected for their ability in mathematics. This might have occurred if these second and third grade students were originally identified based on early reading and language abilities and not on their visual-spatial and number abilities. In the case of students from the Within-Class program, if the gifted students were selected for their general intellectual ability including a component that reflects mathematics, the results of this study could imply that gifted students participating in these programs were missing information in mathematics that they needed in order to perform well on a standardized achievement test.

Program type was a significant variable in the assessment of academic achievement, as was racial/ethnic status. Across all subscales, Caucasian students showed higher achievement than African-American students. As discouraging as this result may seem, African-American students were at or above the mean for their respective grade levels and these scores showed an upward trend from the fall of 1990 to the spring of 1992 (Delcourt et al., 1993). Follow-up analyses also indicated that there were no significant interactions between racial/ethnic status and social status across all five achievement subscales. These results mean that after participating in a gifted program for two years, the students showed scores in achievement which did not differ significantly across three categories of social status (low, medium, high) regardless of their being African-American or Caucasian.

Self-perception. Scholastic Competence pertains to a child's perception of his or her ability to do well academically. Social psychologists have indicated that individuals base their perceptions of self on comparisons they make between themselves and others. One outcome of making social comparisons is that children who compare themselves to

peers of similar academic ability feel an increase in competition, thereby lowering their self-perceptions of scholastic competence (Coleman & Fults, 1982; Hoge & Renzulli, 1991). If this is true, one would hypothesize that students from the Gifted Comparison Group, Pull-Out program, and Within-Class program should have had higher perceptions of their scholastic abilities than children from the Separate Classes and the Special Schools, since the former were in heterogeneously grouped classes according to ability while the latter were in homogenous groups. This was in fact the case. These results are supported by researchers who point out the importance of documenting the social reference groups employed by those identified as gifted, since the scores of these students vary when they compare themselves to either their gifted or nongifted peers (Coleman & Fults, 1982, 1983; Harter & Zimpf, 1986; Rogers, Smith, & Coleman, 1978). Therefore, student perceptions about their abilities appear to vary depending on the type of program in which they are placed. This is an appropriate outcome based on social comparison theory.

The absence of any differences across groups for perceived Social Acceptance suggests two possible explanations. First, children in elementary school may not be ready to respond to questions about their social relations. Their perception of themselves in relation to others may be too egocentric to allow for distinct reactions to statements about popularity and satisfaction with one's peer group. A second explanation is that children in all groups seemed comfortable with the degree to which they were accepted by their peers. This means that children find friends and are likely to feel comfortable in any grouping arrangement, thus decreasing the concern that acceptance by peers should be a primary criterion when selecting a type of program for high ability elementary school students. Nevertheless, school personnel are certainly not exempt from focusing on the adjustment needs of their students. Many programs in the study incorporated goals for developing intra and inter-personal understanding, a factor that may have influenced the finding of no significant differences across groups.

Results also revealed that Caucasian and African-American students have similar perspectives of competence about their scholastic capabilities and their social relations, as assessed by the Scholastic Competence and Social Acceptance scales, respectively (Harter, 1985). These results are not shared by Fordham and Ogbu (1986) who found that African-American students have lower perceptions of their academic abilities than Caucasians. This may mean that Scholastic Competence is a developmental construct which is present to a greater degree in African-American children at the elementary school level and that perceptions of scholastic ability for this population decrease over time. Another explanation is that more positive attitudes toward education were prevalent in the schools selected for the present study.

Intrinsic/extrinsic motivation. This construct was assessed using a scale called Intrinsic Versus Extrinsic Orientation in the Classroom (Harter, 1980). The subscale of internal criteria for success/failure examines the degree to which an individual is reliant on internal or external sources of evaluation, with high scores assigned to the internally motivated individual. After considering initial variations in scores and the social status of the families in the study, no significant differences appeared across groups, nor did differences according to racial/ethnic status.

The subscale of Independent Judgment is the ability to make decisions based not only on the capacity to discriminate between and prioritize tasks, but also on the amount of practice one has in making these judgments. When all six groups were compared, students from Within-Class and Special School programs felt more capable than nongifted students to make judgments about what to do in school. These statistically significant results indicated that students in homogeneous and heterogeneous grouping arrangements had the opportunity and preferred to make their own judgments regarding classroom activities.

There were no differences between groups when responses from the four gifted programs were compared.

Independent Mastery refers to the degree to which a child prefers to work on his or her own. High scores reflect a student's preference to learn independently. Students from Separate Class programs were the most reliant on teacher guidance for completing assignments and solving problems. Their scores were significantly lower than those of students from the Pull-out and Within-Class programs, and the Nongifted Comparison Group. Students from Separate Class programs also viewed their learning environments as highly teacher-oriented, were more dependent on external sources of evaluation, preferred fewer challenges, felt less competent scholastically, and less accepted by their peers, as evidenced by their having the lowest mean scores in each of these areas. Separate Class programs may be providing their students with academically rigorous agendas, but these data suggest a need for a greater focus on affective development.

The author of this instrument, Susan Harter (1980), describes the Preference for Challenge scale as a dichotomy between the preference for challenge vs. the preference for easy work assigned. High scores indicate that students prefer more challenging tasks. A problem with the interpretation of this construct is the lack of information about the difficulty of the tasks offered in each program. For instance, an item from this instrument directs students to choose a statement that best describes them: *"Some kids like to go on to new work that's at a more difficult level"* but *"other kids would rather stick to the assignments which are pretty easy to do"*. A low rating for this item does not necessarily imply that students do not want to be challenged, but perhaps that they are already being challenged and would not want more work. This seems a reasonable hypothesis since the programs with the lowest scores were the ones with the highest levels of achievement in a traditionally more academic environment, the Separate Class and Special School programs. Likewise, it is difficult to interpret the reason why African-American students in programs for the gifted had significantly lower scores on this scale than their Caucasian classmates. While members of the former group also had lower scores in achievement than Caucasian students, they *had* been recognized by their teachers for their gifted behaviors through the selection process for the program. It is likely that a reexamination of achievement needs to be considered for African-American students. In an investigation of achievement and self-concept of minority students, Cornell, Delcourt, Goldberg, and Bland (1995) indicated that "Future studies should investigate whether standardized test scores are equally predictive of academic success for both minority- and majority-group students" (p. 202). Moreover, student perceptions of academic success and challenge should be researched among these groups.

Attitudes toward learning. This measure was analyzed after controlling for initial differences on each scale because a lower response rate prevented statistical analyses using the covariate of social status. This instrument assesses the degree to which students perceive their classrooms as being student-centered or teacher-centered. High scores indicate that the classroom is perceived as an environment that provides opportunities to share ideas with classmates, pursue topics of interest, and progress at one's own rate. Results indicated that students in Special Schools had more positive attitudes toward learning than students in all other settings. There was no significant difference, however, between scores from Special School subjects and members of the Gifted Comparison Group. One might hypothesize that, in order to compensate for the absence of a program, teachers were trying to provide their gifted students with more structured opportunities to engage in self-directed learning. Two national United States studies, however, both of regular classroom practices with gifted students, provide conclusions to the contrary (Archambault, Westberg, Brown, Hallmark, Emmons, & Zhang, 1993; Westberg, Archambault, Dobyns, & Salvin, 1993). Another explanation for these results may be that

gifted students in regular classrooms are provided with less direction than other students as a result of the "they're so smart, they can figure it out for themselves" attitude toward the gifted. Consequently, these students perceive their classrooms as more student-centered than do many other gifted students attending programs. Unfortunately, this survey does not provide data on the quantity or quality of the child-centered activities, but only on the students' perception of these specific activities as they might occur in the classroom.

Teacher ratings. These measures were analyzed after controlling for initial differences on each scale because lower teacher response rates prevented statistical analyses using the covariate of social status. The most striking pattern among these data was the significantly lower scores for teacher ratings of students in Special Schools as compared to students in all other types of programs. A possible explanation for the higher ratings for students in the other program categories is the point of reference used by teachers. In other words, teachers rating students from the Separate Class program, Pull-Out program, Within Class program, and Comparison Groups may have been comparing the characteristics of the subjects in the study to the characteristics of the many students in their classes and schools, thus, seeing higher levels of these characteristics and rating them above average more often than did the teachers from Special Schools. Lower ratings by teachers in Special Schools may also be due to the possibility that teachers who elect to teach in or are selected for these school programs have higher expectations for student performance.

Student activity survey. One important goal of many gifted programs is to stimulate independent learning through the pursuit of special projects (Roeder, Haensly, & Edlind, 1982; Treffinger & Renzulli, 1986). A Student Activities Survey was therefore sent to parents to be completed with their child. Items pertained to student involvement in both curricular and extracurricular special projects in areas such as science, mathematics, humanities, art, and other areas. Subjects in all groups participated in a similar number of types of activities during the spring of year 1 and year 2 of the study.

Behavioral adjustment. The following behavior problem scales were addressed in using the parent and teacher versions of the Child Behavior Checklist (CBCL): Anxious, Depressed, Uncommunicative, Obsessive-Compulsive, Somatic Complaints, Social Withdrawal, Hyperactive, Aggressive, and Delinquent. Results were reported only for the first round of data collection for three reasons. First, the instruments were too time-consuming to continue their administration for all four data collection periods. Second, parents and teachers objected to completing the surveys because they thought the items only focused on the negative aspects of student behavior, with 120 items referring to student problems. Third, a follow-up administration of the instruments in the spring of 1992 yielded extremely poor return rates (3% for teachers and 29% for parents). Fall 1990 scores were covaried for the effects of grade level (second or third grade) and racial/ethnic status (Caucasian or non-Caucasian). There were no significant group differences between gifted and regular education students on any of the subscales. Regarding types of behavior problems, the small proportion of gifted education students having a high incidence of these problems did not differ from that found in a sample of regular education students. These results do not necessarily imply that gifted students and nongifted students are identical in their psychological and emotional needs. It appeared, rather, that students from both groups had the same variety of largely standard behavior problems and that the proportions of serious behavior problems were similar for both groups.

Research Question #3: Are there differential effects in achievement for underserved students after the summer break (spring 1991 and fall 1991)?

There were significant differences across program type and racial/ethnic status for all achievement subtests over the summer break. Generally, in all areas of academics, students in programs for the gifted scored higher than the nongifted and gifted students not attending programs. Since one goal of these school districts was to enhance individual learning skills, the finding that these students continued to gain in achievement over the summer is in agreement with the reports of researchers who concluded that students who are motivated and familiar with independent learning techniques tend to perform better than other students when they find themselves in a less structured environment (Heyns, 1987).

What effects did the summer break have on student achievement regarding racial/ethnic status? Once initial differences in social status had been controlled statistically, Caucasians had higher scores than African-Americans on all subtests, but the means for the latter group remained above the 50th percentile as compared to the norm group and showed an upward trend in all areas of achievement except in science and social studies. For African-Americans, science scores stayed the same over the summer and social studies scores decreased.

Implications and Recommendations

This study has fundamental implications for individuals involved with the improvement of educational services for gifted children, and generally for those committed to the development of a child's talents. Unfortunately, many provisions for the gifted are being eliminated in schools across the United States because of a lack of relevant information about the effects of appropriate educational services. Indeed, recent widely circulated conclusions appear to be "based on subjective reviews and informal analyses of the literature" (Kulik & Kulik, 1991, p. 191).

Recommendations from this study should be considered by policy makers and educators as they assess the impact of their programs for gifted students. These recommendations apply to all who share the responsibility for educating gifted learners, in particular administrators, gifted education specialists, curriculum consultants, guidance personnel, classroom teachers, and parents.

1. The evidence gathered from this empirical study of learning outcomes in gifted education clearly indicates that programs for the gifted are effective. Primary findings in this report revealed that decisions about program implementation should be based on research about learning outcomes for specific program types (Special School, Separate Class, Pull-Out, Within-Class). This is especially important because there are different outcomes in terms of achievement, self-concept, motivation, teachers' ratings of students, and attitudes toward learning for children in different types of programs. Thus programs for the gifted should be evaluated in order to locate areas for improvement to best serve students.
2. In terms of achievement, gifted children attending special programs performed better than their gifted peers not in programs. Specifically, children in Special Schools, Separate Class programs, and Pull-Out programs for the gifted showed substantially higher levels of achievement than both their gifted peers not in programs and those attending Within-Class programs. Policy makers should know that students from Within-

Class grouping arrangements received the lowest scores in all areas of achievement (mathematics concepts, mathematics problem-solving, reading comprehension, science, and social studies) when compared to their gifted peers who participated in either Special School, Separate Class, or Pull-Out programs. Since Within-Class programs are a popular model in gifted education, their curricular and instructional provisions for the gifted must be carefully maintained lest they disintegrate into a no-program format.

3. Teachers' perceptions of student learning characteristics appear to be influenced by the type of program used in a school. Despite the fact that student entry characteristics were similar across programs, teachers in Special Schools consistently rated their students lower in creativity, learning, and motivation. If teachers are giving these students slightly lower ratings because they set higher expectations for them, then educators and researchers must be cautious in their interpretations of data from rating scales: scores from different types of programs might not be directly comparable. Teachers and members of student selection committees should observe the relative ratings of students nominated for their programs instead of selecting an *a priori* cutoff score since mean scores vary depending on the type of program.
4. Students from the Separate Class program scored at the highest levels of achievement with the lowest perception of academic competence, preference for challenging tasks, sense of acceptance by peers, internal orientation, and attitudes toward learning. In programs which stress academics, one should not lose sight of the attention students require for healthy adjustment to the school environment. To address this necessity, teacher preparation for working with gifted children should include instruction for incorporating academics within the development of a realistic and positive self-concept.
5. Students from the Gifted Comparison Group, Pull-Out program, and Within-Class program had higher perceptions of their scholastic capabilities than children from the Separate Class and the Special School programs. The former were in heterogeneously grouped classes according to ability while the latter were in homogeneous groups. This phenomenon occurs after students are initially placed in programs for the gifted and at least up to two years after they have been participating in programs. Parents and teachers should anticipate this phenomenon and be prepared to address this issue by helping students understand that they naturally make comparisons between themselves and their peers, but that they should also learn how to focus on ways to improve their own performance by comparing their own past endeavors with their present efforts and future goals.
6. Students from Within-Class and Special School programs felt more capable than nongifted students to make judgments about what to do in school. Students from both types of programs felt that their learning environments gave them the opportunity to make judgments independently. This means that gifted students as a group do not automatically know how to or learn to make judgments on their own and that teachers should consider a focus on this skill when planning their curricula.
7. Students from Separate Class and Special School programs had the lowest scores regarding preference for challenging tasks. However, an examination of the present instrument showed that these students may also have been indicating that they did not need or want additional work. Determining the degree of challenge presented by a particular program is a complex process and must take into consideration the types of tasks inherent to that program and how they are matched to the abilities and needs of the students.

8. Students' attitudes toward learning were assessed by using an instrument evaluating the degree to which students viewed their environment as being either student-centered or teacher-centered. Students in Special Schools were more likely to view their classrooms as being student-centered than their peers in all other settings. There was no significant difference, however, between scores from Special School subjects and members of the Gifted Comparison Group. Individuals who believe that their programs are student-centered should assess them in terms of this concept, since students do not necessarily view the programs the same way.
9. Adjustment issues were investigated through the administration of an inventory of behavior problems. It appeared that students from both gifted and nongifted groups had the same variety of largely standard problems and that the proportions of serious problems were similar for both groups. However, these results do not imply that gifted and nongifted students possess identical psychological and emotional needs, but that given a list of standard behavior problems, gifted students have similar problems in kind and degree as compared to other students.
10. Subjects in the nongifted comparison group maintained achievement levels at or above the 50th percentile for the two years of the study. Thus the existence of programs for the gifted did not produce any measurably harmful effects on the academic achievement of the nongifted students present in schools with identified gifted students. In addition, there were no differences between any groups in the study regarding their social perspectives. This refers to the finding that students in all groups (gifted and nongifted) felt comfortable with the numbers of friends they had in school and with their own popularity. The type of grouping arrangement did not influence student perceptions of their social relations for gifted or nongifted students.
11. There were no differential effects for Caucasian and African-American students by program type, which leads to the conclusion that no particular program type affected the learning outcomes of students according to racial/ethnic status. Despite the fact that they showed lower performance in achievement than Caucasians, African-American students participating in programs for the gifted maintained above average academic standings throughout the two years of the study. However, during the summer break of 1991, their scores in social studies decreased by the equivalent of seven months over the three month summer period. In addition, their performance in science showed no change, while their Caucasian counterparts increased their achievement by five months over the summer of 1991. The gap in science scores between African-American and Caucasian students after the summer break suggests that children in the former group may be starting their school careers with an even lower understanding of scientific concepts than their Caucasian peers. Perhaps, a summer program offering reinforcement for academic skills would lead to an improvement in the Science and Social Studies scores of these African-American students.
12. Traditionally, African-American students have been underrepresented among the gifted population because of insufficient or faulty identification. The present study, however, demonstrates that once they are admitted into appropriate programs, their achievement levels remain above the national average and continue to follow an upward trend over time. This provides further evidence that these programs are valid, successful learning environments for students from the second largest ethnic population of this country.

In summary, before deciding on any particular option, policy makers should bear in mind that there are significant differences in achievement and affect for students in different types of programs for the gifted. No single program fully addresses all the psychological and emotional needs of students. Yet if success can be gauged by high academic performance and satisfaction with oneself and one's learning environment, then the concept of specific programming for the gifted is clearly valid.

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Evaluation of the Effects of Programming Arrangements on Student Learning Outcomes

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CHAPTER 1: Introduction and Overview of the Study

This project was a two-year investigation of elementary school children placed in programs for high ability learners. The primary purpose of the study was to investigate academic and affective changes in students during their first two years in a gifted program (Cornell, Delcourt, Bland, & Goldberg, 1990). Students were assessed during the fall and spring of the 1990-91 academic year and during the fall and spring of the 1991-1992 academic year. Subjects were from 14 different school districts in 10 states, including African-American, Hispanic, and Caucasian/non-Hispanic students (Caucasian/non-Hispanic students shall be referred to as Caucasian students). The study compared students enrolled in gifted programs, high ability students from districts where no program was available at the designated grade levels, and students in regular classrooms.

The study focused on academic and affective student outcomes through multiple administrations of an achievement test, an attitudes toward learning survey, self-perception and motivation inventories, three teacher rating scales, a student activities survey, and parent and teacher behavioral adjustment scales. In addition to comparing programs in general, an important dimension of the project was to examine characteristics of students from traditionally underserved populations. This was accomplished by including the variables of racial/ethnic status and social status of participants in the study's design.

Statement of the Problem

Recent school budget crises and philosophical debates about student grouping practices have caused many teachers, parents, and administrators to ask about the impact of programs on children identified as gifted and talented. How do different types of programs affect self-concept, motivation, and achievement? What impact do these programs have on nongifted students? A review of the literature on the effects of gifted programs was conducted, revealing that in the past 20 years only 10 studies were published describing the systematic effects of a gifted program over time (Cornell et al., 1990). (Two studies were added to the list since the paper by Cornell et al. was presented. See rationale section in this chapter.) None of these studies investigates academic and affective outcomes across multiple program types.

Purpose of the Research Study and Research Questions

The purposes of this research were threefold: (a) to examine the impact of the specific methods of grouping gifted and talented students within classrooms and schools; (b) to contribute to the improvement of program evaluation practices by investigating both academic and affective outcomes; and (c) to examine program effects on underserved students. The goals were achieved by comparing the learning outcome effects of four standard program strategies for teaching gifted and talented students: (a) Within-Class programs; (b) Pull-Out programs; (c) Separate Class programs; and (d) Special School programs. Specific emphasis was given to learning outcome effects on underserved students.

Learning outcomes were broadly defined to include both academic and affective effects of participating in a gifted and talented program. For purposes of this study, academic effects included performance on standard achievement tests, teacher ratings of student learning behaviors, and student attitudes toward learning processes. Affective outcomes were student self-perception, intrinsic/extrinsic motivation, and behavioral adjustment. Behavioral adjustment was viewed as the degree to which a student had a behavioral problem.

The proposed multi-site, longitudinal study investigated learning outcomes at four stages. A sample of 1,010 second and third grade students were assessed at the time of entrance into one of the four types of programs in the fall of 1990, at the end of their first school year in the program, and at the beginning and end of the 1991-1992 academic year. Students were compared to two control groups, one of comparable students who attended schools that did not provide services for gifted and talented students at the targeted grade levels, and a group of nongifted peers attending classrooms with the gifted participants. Program effects on Caucasian and African-American students were investigated.

Results of this project addressed three major research questions: (a) Are there significant differences between program types (strategies)? (b) Do any of the program types have differential effects on underserved students? (c) Are there differential effects in achievement for underserved students after the summer break (spring 1991 and fall 1991)?

Rationale

Why are students placed in gifted programs? According to educators, theorists, textbook writers, and other authorities in gifted education, high ability students are placed in gifted programs for several reasons. First, it is believed that special programs will help them to learn more and achieve according to their potential. Second, there is a strong belief that challenging and enriching programs will stimulate creativity and foster positive attitudes toward learning. Finally, it is believed that placement in a gifted program will have a beneficial effect on socio-emotional adjustment, enhancing self-concept or ameliorating problems stemming from lack of contact with peers of similar ability and interests.

These reasons must be recognized as assumptions or hypotheses rather than established facts. Consequently, a review of literature was conducted on the effects of gifted programs. Specifically, studies were located which systematically examined the effects of a gifted program over time for elementary and middle school students. No restrictions were placed on the type of program or the kind of outcome measures, but the search was confined to studies that used a pre-post design with a control group. Cook and

Campbell (1979) describe the pre-post model as the most common design in social science, and they consider it one of the most informative and defensible ones for quasi-experimental research.

The last 20 years of articles in 3 leading journals in gifted education were surveyed: *Gifted Child Quarterly*, *Journal for the Education of the Gifted*, and *Roeper Review*. Only 7 studies were located. The search was then expanded to a computer search of Educational Resources Information Center (ERIC) and Psychological Abstracts, but this added only one more published study and some unpublished reports as of the fall of 1990. Since that time, two additional studies were located. Table 1 provides information about these 10 studies. The trend is clear: although there are many theoretical articles, and articles which describe the curricula or goals of different kinds of gifted programs, there are surprisingly few studies which have directly examined how students change over time after entering a gifted program. Research on the effects of gifted programs is generally sparse, unsystematic, and far from conclusive.

In a recent article on ability grouping, Robert Slavin (1990) described the research in gifted education as "generally very poor in quality" (p. 4). Other scholars tend to agree (Robinson, 1990; Rogers, 1989; Shore, Cornell, Robinson, & Ward, 1992). In these times of accountability in education, programs must justify their effectiveness and opinions must be supported by factual evidence.

On the positive side, several well-done studies were found which provide reasonable evidence that some individual gifted programs are effective in meeting specific goals, such as improving writing skills (Coleman, 1983; Stoddard & Renzulli, 1983) or accelerating achievement in mathematics (Parke, 1983) (see Table 1). However, replications of initial findings were not identified in this literature search, nor were comprehensive effects of gifted programs across major domains such as achievement, attitudes, and motivation.

Significance

The purpose of this study was not to ascertain which program was "best," but to improve our understanding of the effects of gifted programs on student academic and affective outcomes. Decisions about which type of program to institute require a cost-benefits analysis that involves factors beyond the scope of this study. A school district must consider available financial and human resources, as well as make value judgments about its goals for gifted and talented students. Beyond these factors, this study provided valuable information on student learning outcomes that can be used to guide rational decision-making in choosing among the various types of gifted programs.

These were the strengths of this study: (a) the design was prospective and longitudinal; (b) the comparative effects of four types of programs were investigated; (c) affective as well as academic learning outcomes were assessed; (d) differential effects on traditionally underserved students were examined.

Table 1

Studies Identified in the Review of the Literature

Author, Journal	Sample	Program	Major Findings
Aldrich & Mills, 1989, GCQ	32 grade 5/6 students in 2 classes, 20 controls	1 day/week for 1 year pull-out	improved reading & vocabulary, but not self-esteem
Carter, 1986, JEG	48 3rd graders in pull-out classes, 13 in nongifted control class	pull-out program over 8 weeks, focus on higher level thinking (HLT) & independent learning	higher achievement test scores for gifted students in program for HLT
Coleman, 1983, GCQ	38 2/3 graders 24 controls	3 hr/week for 9 weeks, creative writing, pull-out	improved writing abilities and attitudes
Feldhusen, Sayler, Nielsen, & Kolloff, 1990, JEG*	24 3-6 graders, 20 controls; 16 7/8 grade, 6 controls	part-time pull-out & enrich. class for 1 yr.	improved self-concepts on 2 scales for elem. students & on 1 scale for mid. school
Olenchak & Renzulli, 1989, GCQ	1698 students, pre-post design relates to 120 students, 66 teachers, 120 parents, 10 principals, 1 control school	schoolwide enrich. 1 yr., combination of pull-out & within-class	improved attitudes toward gifted education by students, teachers, and parents, principals maintained positive attitudes
Parke, 1983, GCQ	22 K-2 students 22 high ability controls & 22 random controls	math self-instruction 3 hr/wk for 10 weeks	improved math skills
Roberts, Ingram, & Harris, 1992, JEG*	30 students in Pull-out, 56 avg. ability students in school with schoolwide enrich. 27 gifted controls, 57 avg. ability controls, all in grades 3-5	pull-out & schoolwide enrich. for 1 yr.	improved higher cognitive process functioning
Stedtnitz, 1986, TECHSE	11 high ability students age 4-6, plus 54 others (33 treatment and 32 controls)	1/2 hr 3X/wk for 8 weeks, triad enrich. to improve self-efficacy	no treatment effect (no change in self-efficacy)

Note: Studies evidently differ in quality and quantity of information reported.
*Added after 1990 paper presentation by Cornell et al.

Table 1 (continued)

Studies Identified in the Review of the Literature

Author, Journal	Sample	Program	Major Findings
Stoddard & Renzulli, 1983, GCQ	180 5/6 grade students in 4 districts; 2 pull-out, 1 within-class, 1 control group	2 hr/week for 6 weeks writing enrichment in a pull-out & in a within-class program	improved writing quality in both groups (better in within-class)
Van Tassel-Baska, Willis & Meyer, 1989, GCQ	19 3/4 graders in 1 classroom 20 controls	full-time separate class program for 1 year	improved analytic ability, but not synthetic or evaluative, school attitudes & self-concept were not assessed prepost

Note: Studies evidently differ in quality and quantity of information reported.
*Added after 1990 paper presentation by Cornell et al.

Procedures

All data collection procedures received prior approval from the University of Virginia Human Subjects Research Committee. The Collaborative School Districts involved with the study implemented their regular identification procedure for selecting students for their gifted programs. Once this selection was completed, parents and students were contacted by letter and asked for permission to be included in the study. Participating students were assessed through multiple administrations of an achievement test (Iowa Tests of Basic Skills, (Hieronymus, Hoover, & Lindquist, 1986), an attitude toward learning scale (Arlin-Hills Attitudes Surveys, Arlin, 1976), a self-perception inventory (Self-Perception Profile for Children, Harter, 1985), and an intrinsic/extrinsic motivation survey (Intrinsic Versus Extrinsic Orientation in the Classroom, Harter, 1980). All instruments were administered in the fall and spring of both the 1990-1991 and 1991-1992 academic years. Testing coordinators at each site received complete instruction in test administration, including scripts for providing student directions. The recommended testing period consisted of two time blocks of two hours each and all students were tested at school during the regular school day. Parents received their instruments through the mail and returned their responses in self-addressed stamped envelopes. These instruments included the Child Behavior Checklist (Achenbach & Edelbrock, 1983), the Student Activities Survey (NRC/GT Staff, 1990) which was completed with and about their child, and a demographics survey. The teachers primarily responsible for the students' instruction completed the teacher version of the Child Behavior Checklist (Achenbach & Edelbrock, 1986) and a set of academic rating scales (Scales for Rating Behavioral Characteristics of Superior Children, Renzulli, Smith, White, Callahan, & Hartman, 1976).

Results

Research Question #1: Are there significant differences between program types (strategies) for gifted students?

Eleven ANCOVA procedures were completed, one for each of the following outcome variables: 5 achievement subtests (Mathematics Concepts, Mathematics Problem Solving, Reading Comprehension, Science, and Social Studies), 2 self-perception inventories (Scholastic Competence and Social Acceptance), and 4 motivation scales (Internal Criteria for Success/Failure, Independent Judgment, Independent Mastery, Preference for Challenge). After controlling for social status and initial differences in first round scores, significant differences in fourth round scores were found in academic achievement and affect across the four types of programs for gifted students. Follow-up analyses were conducted using Student-Newman-Keuls procedures for comparisons of means. Specific outcomes are reported below.

Research Question #2: Do any of the program types have differential effects on underserved students?

The main analyses included eleven ANCOVAs (5 achievement subtests, 2 self-perception inventories, and 4 motivation scales). Procedures examined the main effects of program type and racial/ethnic status and statistically controlled for initial differences in performance as well as social status. There were no first-order interactions for program type and racial/ethnic status for any of the examined variables. In other words, program type did not have any differential effects on underserved students (African-Americans). There were, however, main effects for racial/ethnic status with respect to all areas of achievement. Follow-up analyses were conducted using Student-Newman-Keuls procedures for comparisons of means.

ANCOVA procedures were also conducted on fourth round scores with four variables as the dependent measures (attitudes toward learning processes, and teacher ratings of creativity, learning, and motivation), employing the covariate of initial differences in first round scores. Follow-up analyses are reported. Additionally, series of two-factor (sex x education status) analyses of covariance (ANCOVA) compared gifted and regular education students on the parent CBCL and the Teacher Report Form (TRF) after covarying for the effects of grade level (second or third grade) and racial/ethnic status (Caucasian or non-Caucasian). Finally, descriptive statistics are reported for the Student Activities Survey.

Cognitive and Affective Outcomes

Achievement. Achievement was assessed using five subtests from the Iowa Tests of Basic Skills: Mathematics Concepts, Mathematics Problem Solving, Reading Comprehension, Science, and Social Studies (Hieronymus, Hoover, & Lindquist, 1986). In terms of achievement, gifted children attending special programs performed better than their gifted peers not in programs. Specifically, children in Special School, Separate Class, and Pull-Out programs for the gifted showed substantially higher levels of achievement on posttest assessments than both their gifted peers not in programs and those attending Within-Class programs. Policy makers should also be aware of the fact that after two years of participating in programs for the gifted, students from the Within-Class grouping arrangement received the lowest scores in all areas of achievement (mathematics concepts, mathematics problem-solving, reading comprehension, science, and social studies) when

compared to their gifted peers who participated in either Special School, Separate Class, or Pull-Out programs.

Program type was a significant variable in the assessment of academic achievement, as was racial/ethnic status. Across all subscales, Caucasian students showed higher achievement than African-American students. These African-American students were at or above the mean for their respective grade levels and their scores showed an upward trend over a two-year period (Delcourt, Loyd, Bland, Moon, & Perie, 1993).

Attitudes toward learning. The instrument used to represent this construct was the Attitudes Toward Learning Processes survey (Arlin, 1976). This instrument assesses the degree to which students perceive their classrooms as being student-centered or teacher-centered. High scores indicate that the classroom is student-centered. This type of classroom is perceived as an environment that provides opportunities to share ideas with classmates, pursue topics of interest, and progress at one's own rate. Results indicated that students in Special Schools were the most likely to view their learning environment as student-centered as compared to students in all other settings.

Self-perception. Scholastic Competence and Social Acceptance were examined using the Self-Perception Profile for Children (Harter, 1985). Scholastic Competence pertains to a child's perception of his or her ability to do well academically. Students from the Gifted Comparison Group, Pull-Out program, and Within-Class program had higher perceptions of their scholastic abilities than children from the Separate Classes and the Special Schools. These results are supported by researchers who point out the importance of documenting the social reference groups employed by those identified as gifted, since the scores of these students vary when they compare themselves to either their gifted or nongifted peers (Coleman & Fults, 1982, 1983; Harter & Zimpf, 1986; Rogers, Smith, & Coleman, 1978). Therefore, student perceptions about their abilities appear to vary depending on the type of program in which they are placed. Self-perception also pertains to students' perceived acceptance of their peer groups, and satisfaction with their relationships. There were no differences on the scores for this scale of Social Acceptance across groups or racial/ethnic status.

Intrinsic/extrinsic motivation. This construct was assessed using a scale called Intrinsic Versus Extrinsic Orientation in the Classroom (Harter, 1980). The subscale of Internal Criteria for Success/Failure examines the degree to which an individual is reliant on internal or external sources of evaluation, with high scores assigned to the internally motivated individual. After considering initial variations in scores and the social status of the families in the study, no significant differences appeared across groups, nor did differences according to racial/ethnic status.

The subscale of Independent Judgment is the ability to make decisions based not only on the capacity to discriminate between and prioritize tasks, but also on the amount of practice one has in making these judgments. When all six groups were compared (four gifted programs and 2 comparison groups), students from Within-Class and Special School programs felt more capable than nongifted students to make judgments about what to do in school. These statistically significant results indicated that students in homogeneous and heterogeneous grouping arrangements had the opportunity and preferred to make their own judgments regarding classroom activities. There were no differences between groups when only the responses from the four gifted programs were compared.

Independent Mastery refers to the degree to which a child prefers to work on his or her own. High scores reflect a student's preference to learn independently. Students from Separate Class programs were the most reliant on teacher guidance for completing

assignments and solving problems. Their scores were significantly lower than those of students from the Pull-out and Within-Class programs, and the nongifted comparison group. Students from Separate Class programs also viewed their learning environments as highly teacher-oriented, were more dependent on external sources of evaluation, preferred fewer challenges, felt less competent scholastically, and less accepted by their peers, as evidenced by their having the lowest mean scores in each of these areas.

The author of this instrument, Susan Harter, describes the Preference for challenge scale as a dichotomy between the preference for challenge vs. the preference for easy work assigned. High scores indicate that students prefer more challenging tasks. The programs with the lowest scores were the ones with the highest levels of achievement in a traditionally more academic environment, the Separate Class and Special School programs.

Teacher ratings. Teacher ratings of creativity, learning, and motivation were assessed with the Scale for Rating Behavioral Characteristics of Superior Students (Renzulli et al., 1976). These measures were only analyzed after controlling for initial differences on each scale because lower teacher response rates prevented statistical analyses using the covariate of social status. The most striking pattern among these data is the significantly lower scores for teacher ratings of students in Special Schools as compared to students in all other types of programs. A possible explanation for the higher ratings for students in the other program categories is the point of reference used by teachers. In other words, teachers rating students from Separate Class programs, Pull-Out programs, Within Class programs, and Comparison Groups may have been comparing the characteristics of the subjects in the study to the characteristics of the many students in their classes and schools, thus, seeing higher levels of these characteristics and rating them above average more often than did the teachers from Special Schools. Lower ratings by teachers in Special Schools may also be due to the possibility that teachers who elect to teach in or are selected for these programs have higher expectations of student performance.

Student activity survey. One important goal of many gifted programs is to stimulate independent learning through pursuit of special projects (Roeder, Haensly, & Edlind, 1982; Treffinger & Renzulli, 1986). A Student Activities Survey (NRC/GT Staff, 1990) was therefore sent to parents to be completed with their child. Items pertained to student involvement in both curricular and extracurricular special projects in areas such as science and mathematics, humanities and the arts, and others. Subjects in all groups participated in a similar number of types of activities during the spring of year 1 and the spring of year 2 for this study.

Behavioral adjustment. The following behavior problem scales were addressed in using the parent (Achenbach & Edelbrock, 1983) and teacher (Achenbach & Edelbrock, 1986) versions of the Child Behavior Checklist (CBCL): Anxious, Depressed, Uncommunicative, Obsessive-Compulsive, Somatic Complaints, Social Withdrawal, Hyperactive, Aggressive, and Delinquent. Results were reported only for the first round of data collection for three reasons. First, the instruments were too time-consuming to continue their administration for all four data collection periods. Second, parents and teachers objected to completing the surveys because they thought the items only focused on the negative aspects of student behavior, with 120 items referring to student problems. Third, a follow-up administration of the instruments in the spring of 1992 yielded extremely poor return rates (3% for teachers and 29% for parents).

Using the fall 1990 data from the parent and teacher versions of the CBCL, these variables were covaried for the effects of grade level (second or third grade) and racial/ethnic status (Caucasian or non-Caucasian). There were no significant group differences between gifted and regular education students on any of the subscales.

Regarding types of behavior problems, the small proportion of gifted education students having a high incidence of these problems did not differ from that found in a sample of regular education students.

Research Question #3: Are there differential effects in achievement for underserved students after the summer break (spring 1991 and fall 1991)?

There were significant differences across program type and racial/ethnic status for all achievement subtests over the summer break. Generally, in all areas of academics, students in programs for the gifted scored higher than the nongifted and gifted students not attending programs. One common goal of programs for the gifted in all school districts included in this study was to enhance individual learning skills. The finding that the students continued to gain over the summer is in agreement with certain reports which concluded that students motivated and familiar with independent learning techniques tend to perform better than other students when they find themselves in a less structured environment (Heyns, 1987).

What effects did the summer break have on student achievement across racial/ethnic status? Once initial differences in social status had been controlled statistically, Caucasians had higher scores than African-Americans on all subtests, but the means for the latter group remained above the 50th percentile as compared to the norm group and showed an upward trend in all areas of achievement except in science and social studies. For African-Americans, science scores stayed the same over the summer and social studies scores decreased from the spring of 1991 to the fall of 1991.

In summary, before deciding on any particular option, policy makers should bear in mind that there are significant differences in achievement and affect for students in different types of programs for the gifted. No single program fully addresses all the psychological and emotional needs of students. Yet if success can be gauged by high academic performance and satisfaction with oneself and one's learning environment, then the concept of specific programming for the gifted is clearly valid.

CHAPTER 2: Review of the Literature

Four Program Types in Gifted Education

There is no consensus about the most appropriate instructional delivery system for gifted and talented students (Cox, Daniel, & Boston, 1985; Nash, 1984). Cutting across curriculum content is the specific, practical issue of how students are grouped for educational purposes. Although differences in curriculum and teaching methods are important factors to study, this report focuses on the ways in which students are grouped in order to receive educational services. The four grouping strategies investigated in this study are the most frequently used classroom arrangements nationwide (Gallagher, Weiss, Oglesby, & Thomas, 1983). They also span the full range of classroom grouping strategies, from complete integration of high ability students within the regular classroom to complete segregation of these students in separate schools.

Within-Class Programs

Within-Class programs provide students with special educational services while they remain in the regular classroom (Van Tassel-Baska, 1987). High ability learners may be homogeneously grouped within a particular class or may be allowed to work independently. This mainstreaming approach requires that the classroom teacher adapt the regular curriculum in order to provide appropriate experiences for the identified gifted learner (Kaplan, 1981). The strengths of these programs include the integration of the high ability students with their peers in the general school population (Coleman & Treffinger, 1980), the development of independent learning, when this is the focus of the curriculum (Treffinger, 1986; Treffinger & Barton, 1979), and the encouragement of a more cooperative atmosphere as gifted students help slower learners (Van Tassel-Baska, 1987). Weaknesses of this model can be found in the lack of an apparent peer group based on ability (Van Tassel-Baska, 1987), the possibility of a less challenging curriculum, and the potential repetition of basic skills (Van Tassel-Baska, 1987; Westberg, Archambault, Dobyns, & Salvin, 1993).

Pull-Out Programs

Students in Pull-Out programs are in a regular classroom for most instructional purposes, but leave the classroom for a portion of the school week in order to attend special classes with other identified gifted students (Reis, 1981). The amount of time spent in the special program may vary from a few hours per week to a full day or more per week. As the most popular model in the United States, the pull-out design is employed by approximately 70 percent (Cox & Daniel, 1984) to 95 percent (Oglesby & Gallagher, 1983) of the districts which offer programs at the elementary school level. This design also presents both strengths and weaknesses regarding a student's psychological and emotional needs.

The strengths of this approach lie in the following areas: the contact students establish with their intellectual peers (Renzulli, 1987), the access to more appropriate curriculum during the pull-out sessions (Van Tassel-Baska, 1987), the flexibility of the curriculum which offers more choices for the variety of student interests (Cox & Daniel, 1984), and the integration of students with their nongifted peers for a majority of their educational program (Belcastro, 1987).

In contrast, researchers are critical of pull-out approaches that teach skills without providing instruction for their application to other learning situations such as those found in the regular classroom setting (Cox & Daniel, 1984). Regarding curriculum, Cox and Daniel (1984) also caution that resource classes may become fragmented, producing confusion, when students only participate in these activities for a short time each week and miss regular class activities. Labeling a child "gifted" as a result of being "pulled out" of a class becomes a burden if there exists resentment on the part of the child's age mates (Carter & Kuechenmeister, 1986). Teachers in the regular classroom may also resent the gifted student's being "pulled out" since the top students are absent from class and often report that their special class was more challenging and exciting (Cox & Daniel, 1984). Another potential problem is the lack of communication between the Pull-out program and regular classroom faculty. This situation can result in". . .staff discord and the perception of the gifted program as superficial. . ." (Van Tassel-Baska, 1987, p. 260).

Separate Class Programs

When the Separate Class program is employed, students are grouped by ability for most or all of their academic classwork (Gallagher, Weiss, Oglesby, & Thomas, 1983). Students in the gifted program have little classroom contact with other students, although they may have joint classes for subjects such as music, art, or physical education. Proponents of this form of programming have found no harmful social or emotional effects in placing students in separate environments (Brody & Benbow, 1987). They also agree that gifted students in this setting are relieved of the repetition of their regular class instruction (Feldhusen & Kroll, 1985), are more likely to share their interests in special topics with other students within their group, and display greater achievement and more positive attitudes toward school than gifted students in non-ability grouped settings (Kulik, 1992; Kulik & Kulik, 1987, 1991).

Major disadvantages of separate classes pertain to the students' perceptions of their talent with respect to the abilities of others. Van Tassel-Baska (1987) cites the possible negative effects of "insensitivity to nongifted peers" and "development of self-concept based on perceptions of ability rather than total person" (p. 258).

Special School Programs

Students in Special Schools, theoretically, have the benefit of full-time instruction at a more advanced pace and/or with more thorough coverage of content (Cox, Daniel, & Boston, 1985). Students are selected to attend these programs because of their high aptitude or talent in one or more targeted areas (e.g., art, music, academics). Although completely separated from the general student body in their neighborhood schools, they have maximum opportunity to interact and socialize with peers of comparable ability. This model is not as common as others due to the expense of hiring qualified staff, the maintenance of an additional facility and extra equipment, and often the transportation of students from a wide geographic region. Also required is the philosophical support for an educational program which is totally set apart from the general population (Fox & Washington, 1985).

The strengths of this approach are in its ability to offer an appropriate full-time curriculum for gifted learners (Cox, Daniel, & Boston, 1985) as well as the positive factors cited in the section about separate classroom models. Weaknesses of this option are the potential stress of the demanding courses (Kline & Meckstroth, 1985), the possible lack of appropriate peer and administrative support (Farrell, 1989), and the potential for a student to develop an attitude of elitism while being in a separate school over a long period of time (Newland, 1976).

In summary, the type of program arrangement a school chooses is critical for three reasons. First, it has major impact on the program delivery system such as assignment of personnel and cost of service delivery (Morgan, Tennant, & Gold, 1980). Second, it strongly influences the degree to which the student is publicly labeled as gifted and talented, and determines the potential amount of interaction a student has with both intellectual and same-age peers. Third, much of the debate about effect of different types of programs on academic outcomes, as well as their influence on student affective development, focuses on the programming arrangement through which services are delivered (Cox, Daniel, & Boston, 1985).

Research on Academic Outcomes

Many researchers have examined academic outcomes for a broad range of educational programs (Johnson, Johnson, & Maruyama, 1983; Kulik & Kulik, 1987; Rogers, 1991; Slavin, 1988). There has, however, been little systematic research comparing different program effects for high ability learners. Rather than attempt a comprehensive review of all studies on academic outcomes (see Rogers, 1991, 1993), this report will refer to previous syntheses of literature and representative studies.

Considerable research on the effects of ability grouping on student achievement has led to a general consensus that comprehensive ability grouping, without special curricular and instructional provisions within groups, has little or no effect on the achievement of the general student population (Kulik, 1992; Kulik & Kulik, 1987, 1991; Oakes, 1985, Rogers, 1991; Slavin, 1987, 1988). In contrast, studies of gifted and talented students find that special programs do have a positive effect on academic achievement (Goldring, 1990; Kulik & Kulik, 1987, 1991; Vaughn, Feldhusen, & Asher, 1991). When Kulik and Kulik (1991) reviewed 25 controlled evaluations of separate class programs for the gifted, 19 studies reported that gifted students had higher levels of achievement when they were taught in classrooms grouped homogeneously by ability. Statistical significance was only achieved for 11 of the 25 studies, all of which pertained to homogeneous grouping of gifted and talented students. Goldring (1990) employed meta-analytic procedures to assist policy-makers with the task of assessing the levels of achievement between students in homogeneous classes for the gifted and gifted students integrated into regular classroom programs. She concluded that gifted students in separate classes had significantly higher achievement than their gifted peers in regular classroom settings. Vaughn, Feldhusen, and Asher (1991) reported results of another meta-analysis comparing nine experimental studies of students in pull-out programs with students in regular classes. Their results indicated that participation in pull-out models yielded significantly positive outcomes for high ability students in terms of achievement, critical thinking, and creativity. One of the weaknesses among these reviews is that some of the selected studies were nonpublished documents, and therefore, did not enjoy the benefits of peer review. For example, 16 of the 23 studies cited by Goldring (1990) were dissertations, theses, or unpublished manuscripts.

A review of the literature was conducted on the effects of gifted programs for elementary and middle school students during the last 20 years. Educational Resources Information Center (ERIC) and Psychological Abstracts computer data bases were searched in an effort to locate published studies that assessed cognitive or affective outcomes using a pre-post design with a control group. Key features of these studies are described in Table 1. A total of 10 studies were located. Seven of these included measures of cognitive abilities and the remaining studies focused on affective constructs. Results revealed that students in programs for the gifted had improved cognitive abilities as compared to students in control groups. For instance, Aldrich and Mills (1989) reported improved reading and

vocabulary scores for fifth and sixth grade students in a rural community who attended a Pull-out program one day per week for a full year. Carter (1986) compared students from three settings: a Pull-Out program focusing on higher level thinking skills, a comparison group of gifted students, and a group of nongifted students. He found higher achievement scores for the gifted students in the specialized program focusing on the development of higher level thinking skills. In another study of thinking skills, Roberts, Ingram, and Harris (1992) compared scores from a measure of higher level thinking (HLT) among four groups of third and fourth grade students: those in a Pull-Out program who attended a school using the Schoolwide Enrichment Model (SEM) (Renzulli & Reis, 1985), nongifted students in the SEM school, gifted students in a school where no program was available, and a group of nongifted students in a regular school program. The researchers found that gifted and average ability students attending a SEM school had significantly higher scores on the test of HLT than nontreatment peers. When students in the SEM school were compared, gifted students had significantly higher scores than average ability students. Gifted students in the SEM school had significantly higher scores on the HLT test than nontreatment gifted students and the nontreatment gifted students had higher scores than the average ability students from the SEM school. Van Tassel-Baska, Willis, and Meyer (1989) also examined thinking skills. In their study, third and fourth grade children in a Separate Class program for the gifted were compared to gifted students not attending a program. After one year, students in the Separate Classroom had significantly higher scores on a test of analytic ability, but did not differ from their nontreatment peers in terms of synthetic or evaluative cognitive abilities.

Other researchers have examined cognitive outcomes in specific academic areas. Coleman's (1983) work revealed that second and third grade gifted students attending a Pull-Out program for 3 hours per week showed improved writing abilities after nine weeks. Writing abilities were also analyzed by Stoddard and Renzulli (1983). They compared writing samples of gifted students in a Pull-Out program to students from a Within-Class program and those from a control group. Their results revealed that gifted students in both programs had significantly higher writing quality than students in the control group, with students from the Within-Class program having the highest scores on this variable. Parke (1983) focused on mathematics and found improved mathematics skills in gifted students who participated in a self-instruction course for three hours per week over 10 weeks. These results show that students in programs for the gifted perform significantly better on measures of cognitive ability than their gifted peers not attending programs.

Few studies have examined effects of ability grouping on student attitudes toward learning, although two studies (Enzmann, 1963; Tremaine, 1979) found positive effects for separate classroom placement and Coleman (1983) reported gains in attitudes toward writing for students in a Pull-Out program when compared to the attitudes of students in a control group. Olenchak and Renzulli (1989) reported that attitudes toward gifted education improved for students, teachers, and parents in 10 schools following the implementation of the Schoolwide Enrichment Model (Renzulli & Reis, 1985) for a one year period. Goldring (1990) reported that gifted students in regular classes had more positive attitudes toward their classmates than gifted students in special classes.

It is not clear how different forms of service delivery compare to one another since most of these studies include only one type of program compared to a control group. This is a critical issue, since programs which differ markedly in cost and effort could possibly have comparable effects on academic outcome. Moreover, most studies have concentrated on standard measures of achievement, but have neglected consideration of other desirable academic outcomes, such as positive attitudes toward learning and improved motivation (see Maker, 1986; Sternberg & Davidson, 1986).

Research on Affective Outcomes

Despite the widespread recognition that healthy affective development is both a desirable educational goal in itself as well as a critical influence on learning and achievement (Clark, 1988; Tannenbaum, 1983), few studies have examined program effects in this domain. The most common measures of affect found in the literature are self-concept and motivation.

Self-concept

An individual's self-concept is formed through relationships with others and the development of self-knowledge. Self-concept greatly influences an individual's perception of the world and patterns of behavior (Saurenman & Michael, 1980). A positive orientation is frequently associated with high levels of motivation, a realistic attitude toward oneself, and a favorable outlook on relationships with others. Since self-concept is influenced by one's experiences, there is considerable debate regarding the stability of the construct. This affects results of research conducted over time. Measures of self-concept are also greatly influenced by the definitions employed (see Marsh, Byrne, & Shavelson, 1988; Hoge & Renzulli, 1991). For example, a unidimensional view of self-concept includes all facets of an individual's perceptions under one "umbrella." Instruments based on this model produce a single score and support the hypothesis that self-concept is relatively stable over time. In contrast to this global theory, a second perspective supports a situation-specific view of this construct. Measures of self-concept employed in gifted education research usually include a composite of subscales such as those relating to peers, family, and academics. However, the differing theories underlying the research are not always clearly represented in these studies (Olszewski-Kubilius, Kulieke, & Krasney, 1988).

One aspect of self-concept pertains to an individual's perception of his or her academic ability. Positive correlations have been established between academic self-concept and achievement (Kelly & Colangelo, 1984). Yet, it remains unclear how academic self-concept and achievement influence each other (Hoge & Renzulli, 1991). The link between self-concept and achievement is less obvious when different samples of high ability students are compared. For example, while gifted students received higher scores on tests of self-concept than age-mates of normal ability (Tidwell, 1980; Yates, 1975), students identified as gifted underachievers were found to have lower self-concepts than higher achieving students (Kanoy, Johnson, & Kanoy, 1980). In a meta-analysis of Separate Class programs conducted by Kulik & Kulik (1991), they found that only 6 of 25 studies included a measure of affective development (self-esteem). This was too few to yield persuasive findings, although 4 of the 6 studies did find more positive self-esteem when students were grouped by ability rather than placed in regular classrooms. Goldring (1990) concluded that there were no differences in self-concept for students in separate classes when compared to those in regular classes. Likewise, Vaughn, Feldhusen, and Asher (1991); Aldrich and Mills (1989); and Van Tassel-Baska, Willis, and Meyer (1989) found similar results for their analyses of students in pull-out programs. In another study of Pull-Out programs, Feldhusen, Sayler, Nielsen, and Kolloff (1990) found that third through eighth grade students had more positive self-concept scores than their peers in control groups.

Several researchers have indicated the importance of documenting the social reference groups employed by those identified as gifted, since the scores of these students vary when they compare themselves to either their gifted or nongifted peers (Coleman & Fults, 1982; Harter & Zimpf, 1986; Rogers, Smith, & Coleman, 1978). Therefore, the

type of school program might also have an influence in the self-concept of gifted students. Using subscale scores and a total score from the Piers-Harris Children's Self-Concept Scale, Stopper (1979) reported that students in a self-contained program for the gifted had lower measures of self-concept than nongifted students in regular classroom settings. Coleman and Fults (1982) found similar results employing a total score from the same instrument: gifted students who attended "pull-out" programs had lower self-concepts as compared to high achieving students in the regular classroom. Contrary to these results, when Maddux, Scheiber, and Bass (1982) employed a total score from a self-esteem index, they found no significant differences in self-concept scores between fifth and sixth grade gifted students placed in either a self-contained classroom, a partially segregated class or a regular classroom. Using a unidimensional measure of self-esteem, Aldrich and Mills (1989) found no significant difference between a comparison group of high ability students and an experimental group that attended a one-day per week pull-out program.

Research studies using a situation-specific measure, such as Harter's Self-Perception Profile for Children (SPPC) (1985), provide a relatively consistent pattern that students in heterogeneously grouped programs have somewhat higher self-concepts than students in homogeneously grouped classes. Schneider, Clegg, Byrne, Ledingham, and Crombie (1989) found that the academic self-concept scores were higher for gifted students in regular classes than for gifted students in self-contained programs or for a group of nongifted peers. Chan (1988) reported similar results for seventh grade students, finding that fifth and sixth grade students from pull-out programs had significantly higher scores for scholastic competence than their nongifted peers.

Evans and Marken (1982) reported differences in self-concept by program type for high ability students in sixth through eighth grade. The control group of gifted students who did not choose to enter a program had significantly higher scores on the congeniality-sociability scale than the experimental group (self-contained classroom). It appeared that students in programs for the gifted had lower self-concept scores than gifted students not placed in these programs. This conclusion must be viewed in light of the relatively high self-concepts of gifted students in general (Coleman & Fults, 1982).

In summary, self-concept is positively related to gifted behavior, but other circumstances affect this variable in its multiple contexts. A student's conception of self is cumulative and a developmental view may be of more relevance in order to comprehend the construct (Maddux, Scheiber, & Bass, 1982).

Motivation

Theories of motivation attempt to explain how much and what type of control an individual can exert over his or her behavior. In the study of gifted individuals, motivation has played an important role in understanding what contributes to giftedness. It is mentioned repeatedly in the literature as persistence and intense interest in a chosen subject area (Haensley, Shiver, & Fulbright, 1980; MacKinnon, 1978; Renzulli, 1978; Terman, 1959). In an attempt to clarify motivation, many theorists use the terms "internal" and "external," or "intrinsic" and "extrinsic" to describe varying types of control in different situations. As is the case with self-concept, motivation is viewed as a trait (innate ability) or a state (situation-specific behavior), depending on the particular theory employed. Harter (1980) agrees with the situation-specific view of motivation and has developed an assessment tool for classroom use. Her instrument, Intrinsic Versus Extrinsic Orientation in the Classroom, includes five subscales: Preference for Challenge vs. Preference for Easy Work Assigned (PC), Curiosity/Interest vs. Pleasing the Teacher/Getting Grades (CI), Independent Mastery vs. Dependence on the Teacher (IM), Independent Judgment vs. Reliance on Teacher's Judgment (IJ), Internal Criteria vs. External Criteria for

Success/Failure (IC). Harter also believes that motivation is developmental. She reports systematic developmental differences for each scale (1980). Linear trend analyses conducted on data from the standardization sample indicated that scores for younger students represented a more intrinsic orientation for the three subscales of PC, CI, and IM. This preference gradually changes to an extrinsic orientation by the ninth grade. The opposite pattern occurs for the subscales of IJ and IC, as a student begins with an extrinsic orientation and progresses to a more intrinsic perspective. Employing Harter's scales with gifted students in grades 5 through 10, Henderson, McGuire, Betchart, and Loughlin (1988) found that gifted students were consistently intrinsically motivated across all subscales.

Another popular motivation theory is offered by Elliott and Dweck (1989). They believe motivation depends on the goals of the person in a particular situation. Their theory involves: performance goals, i.e., an individual's perception of how he or she is being judged while completing a task; and learning goals, i.e., the mastery of skills while completing a task. Employing this theory, Ames and Archer (1988) found that junior high/high school students attending a school for the academically advanced adapted their perceptions of a given task, and therefore their motivation for completing the task, depending on the orientation of the classroom environment. In another study of motivation and its relation to the environment, Clinkenbeard (1989) examined perceptions of competitive situations for 67 gifted adolescents who had just completed the sixth or seventh grade. She presented students with either a competitive (C) scenario of a school-related project or an individualistic (I) scenario. She found that students in the I group were more likely to recognize the satisfaction inherent in the learning process, the importance of effort involved in a project, the sustained interest related to a project, and the amount that can be learned from an individualistic project.

Many researchers conclude that motivation depends on the environment. Factors influencing motivation include: the intrinsic versus extrinsic orientation of the classroom, one's degree of concern for the judgment of others versus one's focus on the skills required to complete a task, and the competitive versus individualistic orientation of a project. It may be that the form of service delivery model affects student motivation by providing services in a manner particular to the environment, be it a resource room program, a regular classroom setting, a separate classroom, or an entire school.

Behavioral Adjustment

Despite widespread agreement that high ability is usually associated with healthy adjustment, serious concerns remain about affective maladjustment among some gifted program students (Colangelo & Zaffrann, 1979; Heller & Feldhusen, 1986; Janos & Robinson, 1985; Schauer, 1976; Whitmore, 1980). There are conflicting views about the possible effect of gifted programs on the affective adjustment of high ability students. One contention is that these students fail to achieve to their full potential in regular classrooms, and that they experience chronic stress and frustration as a result of an inappropriate educational environment (Clark, 1988; Gowan & Demos, 1964; Newland, 1976; Sanborn, 1979; Tannenbaum, 1983). From this perspective, placement in a gifted program would have an ameliorative or preventive effect on affective problems. This contention has yet to be adequately investigated.

An opposing contention is that gifted and talented students are subject to excessive academic pressures which also can lead to affective development problems, especially anxiety and depression (Elkind, 1981; Webb, Meckstroth, & Tolan, 1982). Concerns about elitism and alienation of gifted program students from their peers have also been raised (Congdon, 1980; Feldman, 1979). Finally, the potentially adverse effects of *gifted*

labeling, an unavoidable consequence of pull-out, separate class, and special school arrangements, have received increasing attention (Congdon 1980; Cornell, 1984, 1989, Cornell & Grossberg, 1989; Freeman, 1985; Robinson, 1986; Seldman, 1988). The contention that gifted programs can have a negative effect on student affective development demands investigation.

Traditionally Underserved Student Populations

African-American and Hispanic students represent a special segment of the gifted and talented population which has not yet received adequate research attention (Baldwin, 1985; Richert, 1986). The current literature offers little information concerning characteristics of these students enrolled in elementary school gifted programs (Cooley, Cornell, & Lee, 1990; Maker & Schiever, 1989). In fact, many authors have noted the difficulties of identifying culturally diverse students for these programs (Baldwin, 1985) and the need to consider both academic and affective outcomes for Hispanic and African-American students (Frasier, 1979; Maker & Schiever, 1989).

Another underrepresented group in programs for the gifted are those students from low income families. According to Menacker (1990), family income "has always been a critical feature of student background that has most heavily influenced the school success or failure of students" (p. 318). Researchers are questioning the impact of racial/ethnic status as a primary characteristic for their investigations of equity in education. Instead of, or in addition to racial/ethnic status, socioeconomics has been designated by some researchers as the deciding variable for issues of student performance (Wilson, 1980). In comparisons of American College Test (ACT) scores of high school students and reading achievement scores of elementary school students, Menacker (1990) found that those from low-income schools had significantly lower achievement than their counterparts in higher-income schools. He concluded that "the environmental conditions that influence the learning predisposition of students is of major importance" (p. 324).

The influence of the environment is particularly vivid during the summer months when a structured school program is no longer a factor. Loss of achievement over the summer has been frequently documented (Allinder, Fuchs, Fuchs, & Hamlett, 1992; Beggs & Hieronymus, 1968) especially for students who are not self-motivated learners and who have lower retention rates (Heyns, 1987). Heyns' review of the effects of the summer break on children revealed that "the majority of studies found that reading, vocabulary, and language skills change little if at all during the summer, while math and spelling tend to decline" (p. 1152). She also concluded that the less advantaged gain the least over the summer months and that gifted students show higher levels of retention over the summer than their nongifted peers. This study examined the effects of both racial/ethnic and social status on the learning outcomes of students, and investigated the changes in achievement over the summer break.

CHAPTER 3: Procedures

Methodology

How Subjects Were Selected

In order to investigate program effects, students were assessed at the time of their initial placement in a gifted and talented program. The proposed study selected second and third grade students because most programming begins at these levels (Gallagher, 1986). Collaborative School Districts were chosen for study from the large pool of districts that agreed to participate in the NRC/GT. Criteria for selecting specific school districts were based on the presence of one of the four types of programs, as well as the presence of a diverse student population that included at least 10% non-Caucasian students. After obtaining permission to conduct the study within each district and school, parents were contacted by mail and asked to return a postcard indicating their willingness to participate in the study. Approximately 2,850 parents were contacted, with a consent rate of 41%. A follow-up survey was mailed to a sample of 200 non-respondents. Of the people who responded to this survey, the reasons for declining to participate in the study were: they did not recall receiving the letter about the study ($n = 9$); they lost the letter or forgot to return it ($n = 8$); the project involved too much of their child's time ($n = 8$); they did not like the idea of having their child participate in a research project ($n = 5$); they did not want this type of data collected about their child ($n = 4$); they did not feel the project was explained adequately ($n = 4$); they felt the project involved too much of their time ($n = 2$).These were the most frequent reasons, those made by two or more parents. There were two control groups. These subjects were obtained either from districts which did not provide programs for the gifted and talented prior to the sixth grade or they were nongifted students.

Program Demographics

The researchers identified three to four example programs for each program type in order to enhance the robustness of study findings. Students in gifted programs were compared to students of comparable ability in school districts which did not provide gifted programs prior to the sixth grade. This comparison avoided the potential ethical and legal problems of identifying students who meet criteria for their school's gifted program, but must be excluded from the program in order to serve as control subjects. Students in this gifted comparison group were selected for the project by teacher nomination, largely based on performance in reading and mathematics. Average to above average ability students were included in the nongifted comparison group. These students attended the same schools as the subjects from the Separate Class programs, Pull-Out programs, and Within-Classroom programs. Low ability students were not included in the study because district coordinators and parents felt that the additional testing required for participation in the project would remove these students from valuable instructional time in their classrooms. Coordinators also communicated that these low ability second and third grade students may not have the requisite reading skills to participate in the present project.

Subjects were from 14 different school districts in 10 states, including Native-American, Asian-American, African-American, Hispanic, and Caucasian students. The categories of Hispanic, Asian-American, and Native-American were too small to be used in statistical analyses. The distribution of this sample with respect to racial/ethnic characteristics is reported in Table 2. This does not necessarily reflect the proportion of students from diverse cultural backgrounds participating in programs for the gifted and talented in the United States. Unfortunately, that percentage is reportedly lower (Maker &

Schiever, 1989). A description of additional demographic information is located in Appendix A.

Table 2

Proportion of Reported Racial/Ethnic Characteristics

Racial/Ethnic Status	Total U.S. Population 1990 Census[a]	Total U.S. School Enrollment[b]	Learning Outcomes: Gifted Student Sample	Learning Outcomes: Total Student Sample Used in Analyses
Caucasian	74%	73%	62%	72%
African-American	11%	16%	27%	28%
Hispanic	8%	8%	8%	N/A[c]
Other	7%	3%	3%	N/A

[a] U.S. Bureau of Census. (1990). *Population statistics*. Washington, DC: U.S. Department of Commerce.

[b] Total U.S. School Enrollment from 1983-84 *Digest for Education Statistics* of the National Center for Education Statistics.

[c] N/A- not applicable.

There were three examples of Special School programs, Separate Class programs, and districts without programs, as well as four examples of Pull-Out programs and Within-Class programs. One school supplied students from two types of programs and another school provided representation from three program types. A total of 83 schools participated in this project. Table 3 contains a description of program identification procedures used in each district, indicating the similarity among criteria employed for student selection. All gifted programs focused on an academically oriented curriculum in contrast to one stressing only a particular talent area. Students from Special Schools were homogeneously grouped on a full-time basis in schools designated for the gifted and talented. Two of these districts were located in urban areas and one was in a rural/suburban region. All had a high proportion of students from traditionally underserved populations (African-American and Hispanic students). Those in Separate Classes received their instruction in homogeneous groups for all content-area courses and were housed in schools with students not identified as gifted and talented. Students participating in Pull-Out programs attended a resource room for two hours each week (range of 120 to 125 minutes per week) with curriculum based on interdisciplinary units and independent study. For districts with the Pull-Out model, none of the program documentation plans explicitly states that integration with regular classroom activities is a goal of the gifted program, however, conversations with district coordinators of the gifted and talented reveal that this is a sought after result. Those from Within-Class programs attended heterogeneously grouped classes 100% of the time where differentiation of the curriculum was achieved in a variety of ways such as cluster grouping (implemented in one of the districts), independent study, as well as creative and affective enrichment activities. All programs had goals pertaining to both academic and affective outcomes. Their instructional techniques were tailored to the needs of high ability learners. A more detailed account of each program's curricular options is located in Appendix B.

Students in the Gifted Comparison Group were selected for the project by teacher nomination, largely based on performance in reading and mathematics. While these criteria were not as comprehensive as the identification procedures used to select the gifted students participating in the study, it is important to note that the school administrators selected students for the gifted comparison group with the intention of targeting them for inclusion in their gifted programs at a later date. The Nongifted Comparison Group was composed of average to above average ability students. Thus, the students performing below average or those with learning difficulties were not participants in the study.

All districts with programs for the gifted require that teachers have specialized training in the characteristics and needs of gifted learners. Nine out of 11 districts with programs for the gifted, encourage their staff to complete graduate courses on topics such as creativity, characteristics of the gifted, thinking skills, and early childhood development of the gifted. All districts state that they provide ongoing staff development for teachers who work in their programs for gifted students.

Table 3

Identification Instruments of Participating Gifted Programs

Program Type	Years in Operation	Number of Participating Students Gifted/ Non-gifted	Number of Participating Schools	Identification Instruments
Special School				
A	5	49/NA[a]	1	Achievement test (80), IQ, Teacher & Parent evaluation
B	5	37/NA	1	Achievement test, IQ, Teacher evaluation
C	14	24/NA	1	Achievement test, Teacher evaluation
Separate Class				
D	5	67/43	7	IQ (96), Teacher evaluation
E	4	17/0	1	Achievement test (90), IQ, Teacher & Parent evaluation
G	9	50/41	9	Achievement test, IQ, Teacher evaluation
Pull-out Class				
H	5	58/41	10	IQ (96), Teacher & Parent evaluation
I	12	16/18	6	Achievement test, IQ, Teacher evaluation
J	6	128/49	14	Achievement test, IQ, Teacher evaluation
K	11	15/12	4	Achievement test (84), IQ, Teacher evaluation

Note: Few programs reported use of a fixed cut-off score for achievement or IQ testing. Reported cut-off percentiles are given in parentheses. IQ tests refer to both individual and group administered tests.

[a] N/A- not applicable.

Table 3 (continued)

Identification Instruments of Participating Gifted Programs

Program Type	Years in Operation	Number of Participating Students Gifted/ Non-gifted	Number of Participating Schools	Identification Instruments
Within-Class				
L	5	72/37	8	IQ (96), Teacher & Parent evaluation
M &	5	52/68	4	IQ, Teacher, Parent, Student evaluation
N	9	41/0	5	Achievement test (95), IQ (95), Teacher evaluation
O	7	36/37	5	Achievement test (92), Teacher evaluation
Gifted Comparison Group				
P	N/A[a]	49	4	Reading and Mathematics performance
Q	N/A	21	1	Reading and Mathematics performance
R	N/A	35	2	Reading and Mathematics performance

Note: Few programs reported use of a fixed cut-off score for achievement or IQ testing. Reported cut-off percentiles are given in parentheses. IQ tests refer to both individual and group administered tests.

[a] N/A- not applicable.

Students

The population targeted for study consisted of second and third grade students placed in one of four types of programs. Subjects were identified and selected by individual school programs, not according to researcher-imposed standards. This sample selection procedure has the advantage of a more naturalistic study of programs as they currently operate. The disadvantage of this approach is that differences in program selection criteria can confound analyses of program effects. This potential problem was addressed by selecting districts with similar identification procedures, by examining whether there were program differences in the achievement level of identified students, and by employing procedures that statistically controlled for variations in social status as well as initial differences on each variable.

The sample size was 1,010 students, including 604 students in programs for the gifted and talented, 97 gifted students who were not in programs, and 268 nongifted students. (The status of 41 students was not available). The sample contained 514 females and 471 males (25 students were not identified by sex). Refer to Table 4 for a breakdown of the sample by program type and racial/ethnic status. Survey and test forms with missing data were excluded; consequently, sample sizes varied across data analyses.

Table 4

Sample Size for Racial/Ethnic Status and Program Type

	Racial/Ethnic Status				
Program Type	African-American	Caucasian	Hispanic	Other	Total
Special School	61	20	25	-	106
Separate Class	33	84	18	7	142
Pull-Out	24	149	2	5	180
Within-Class Gifted	61	104	4	7	176
Comparison Group	4	89	2	2	97
Nongifted Comparison Group	109	150	1	8	268
Total	292	596	52	29	969*

Note: The symbol "-" indicates that no available data could be applied to this category.

* From a total of 1,010 subjects, the status for 41 students was not available.

Design

The study employed a quasi-experimental design with pre-post assessment of multiple groups. There were four types of gifted programs and two control groups. There were three to four examples of each program type in order to enhance the robustness of study findings. Baseline data on academic and affective measures were obtained at the beginning of a child's participation in the program for the gifted and talented. In the fall of 1990, these data were collected independently of any other information used in the school district's identification procedure and were not used in the school's student selection process. Follow-up data were collected at the end of one academic year and at the beginning and end of the following year. The average time between testing periods was approximately 25 weeks. Table 5 offers a summary of the groups and variables employed in this study.

Table 5

Variables Included in the Learning Outcomes Study

Independent Variables
- Type of program (4 types of programs and 2 comparison groups)
- Racial/ethnic classifications (African-American or Caucasian)

Dependent Variables
- Academic Outcomes
  - Achievement test scores from the Iowa Tests of Basic Skills (ITBS) (Hieronymus, Hoover, & Lindquist, 1986): Mathematics concepts, Mathematics Problem Solving, Reading Comprehension, Science, Social Studies
  - Scale for Rating Behavioral Characteristics of Superior Students (Renzulli et al., 1976): learning, motivation, and creativity
  - Arlin-Hills Attitudes Surveys (Arlin, 1976): Attitudes Toward Learning Processes
  - Student Activities Survey (NRC/GT Staff, 1990): numbers of types of school projects and extracurricular projects
- Affective Outcomes
  - Self-Perception Profile for Children (Harter, 1985): Scholastic Competence, Social Acceptance
  - Intrinsic Versus Extrinsic Orientation in the Classroom (Harter, 1980): Preference for Challenge vs. Preference for Easy Work Assigned (PC), Independent Mastery vs. Pleasing the Teacher (IM), Independent Judgment vs. Reliance on the Teacher's Judgment (IJ), Internal Criteria for Success/Failure vs. External Criteria (IC)
  - Child Behavior Checklist (Achenbach & Edelbrock, 1986): Teacher ratings of behavioral adjustment (8 problem scales, 3 competence scales)
  - Child Behavior Checklist (Achenbach & Edelbrock, 1983): Parent ratings of behavioral adjustment (9 problem scales, 5 competence scales)

Control Variables
- Each of the dependent variables at Time 1 was used as a covariate for analysis of group differences at Time 4
- Hollingshead Four-Factor Index (1975) of social status was used as a covariate

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Independent Variables

The major independent variables of this study were program type (four types of gifted programs, a control group of gifted students who did not have a program for the gifted available in their schools, and a control group of nongifted students), and multiple classifications of each student, such as African-American or Caucasian.

Dependent Variables: Academic Outcomes

Programs may pursue different academic goals and have different learning effects. Accordingly, researchers obtained multiple academic measures from several perspectives in order to assure a reasonably comprehensive assessment of student learning outcomes (Glaser & Strauss, 1967; Smith, 1975). The applicability of the instruments for the sample of gifted learners was investigated through an examination of the internal consistency reliability and stability coefficients for achievement, self-perception, intrinsic/extrinsic motivation, and teacher ratings (Delcourt, Loyd, & Bland, 1992). Additionally the factor structures of the self-perception and motivation scales were analyzed (Goldberg, 1994). Results of the validity and reliability studies are available in Appendix C.

Achievement

Since schools generally do not routinely administer achievement tests on all four occasions required by this study, arrangements were made for the administration of all instruments. Comparisons were made only for tests designed to measure the same abilities (e.g., math computation was not compared with math problem solving). Students were administered selected subtests from the Iowa Tests of Basic Skills (ITBS) (Hieronymus, Hoover, & Lindquist, 1986). Form J was administered in the fall and students completed an alternate form, either G or H, in the spring. The internal consistency reliability estimates reported by the authors across Level 8 (Grade 2), Level 9 (Grade 3), and Level 10 (Grade 4) ranged from .91 to .93 for Reading Comprehension (RC), .80 to .87 for Mathematics Concepts (MC), .76 to .89 for Mathematics Problem-Solving (MPS), .67 to .86 for Social Studies (SS), and .66 to .89 for Science (SC).

In this study, a major decision for data collection concerned whether to administer the Iowa Tests of Basic Skills (ITBS) at the same level as a student's grade level or out-of-level, one level above the norm. An examination of a sample of tests given out-of-level in the fall of 1990 (n = 200) revealed that same-level testing was appropriate for the entire sample. This decision was based on two considerations. First, as identified in the fall 1990 testing period, many second grade students, the largest portion of students in the study (n=831), lacked the developmental readiness to use the "bubble sheet" format employed for the out-of-level test. Second, results of the first round of data collection indicated that the raw scores were low enough to allow for the measurement of possible growth between the first and second administrations of the ITBS. In other words, on-level testing would not produce ceiling effects.

Analyses are based on grade equivalent (G.E.) scores. These scores are printed in a conventional form used by ITBS. The first number indicates a grade level in years while the second indicates a performance level based on months in the academic year beginning with September. Therefore, a score of 37 refers to the third grade, seventh month of school, March. These scores are the most appropriate values when comparing responses from multiple levels of tests and observing growth over time. The ITBS was constructed with overlapping items from one year to the next, making it possible to compare scores from students at different grade levels using the grade equivalent standard. In the past, G.E. scores were inadequate indicators of student progress over time because the tests at

each grade level were discrete instead of overlapping. Presently, the scaling of an individual's score using the Iowa Tests of Basic Skills is more accurate. For example, a G.E. score that is above a student's present grade level in school, such as a third grade student with a G.E. in science of 50, means that the child has a high achievement level in science. The score does not mean that the child should be moved into a fifth grade science class.

Attitudes Toward Learning

Many educators note that high ability students may develop poor attitudes toward school if they are not taught in an appropriately stimulating environment (Clark, 1988; Tannenbaum, 1983). In order to address this issue, one of the questionnaires from the Arlin Hills Attitude Surveys was used to measure student attitudes toward learning processes (Arlin, 1976). This instrument assesses a student's perception of his or her degree of participation in classroom activities. The authors of this survey take the view that a student-centered classroom is a more positive learning environment than a teacher-centered environment. The 15-item instrument asks students to respond on a 4-point Likert response scale to items pertaining to attitudes about classroom activities such as the amount of homework they receive and the opportunities they have to work with friends throughout the day. Total scores range from 0 (low) through 60 (high) with a value of 30 or higher indicating a positive attitude. Standardization of the instrument took place in the spring of 1974 with over 13,000 students in grades 1 through 12 from a single southern state. Three levels of the instrument are available: primary for grades K-3, elementary for grades 4-6, and high school for grades 7-12. A description of the sample based on sex or racial/ethnic status was not provided in the manual (Arlin, 1976). The internal consistency reliability estimate reported by the authors for this survey was .90 across grades 1 through 12 (n = 6,000).

Teacher Ratings

The Scales for Rating the Behavioral Characteristics of Superior Students (SRBCSS) (Renzulli, Smith, White, Callahan, & Hartman, 1976) was selected for this study. This standard identification instrument has been recommended as an outcome evaluation measure (Callahan, Landrum, & Hunsaker, 1989). Teachers completed three subscales from this rating scale: Learning (8 items), Motivation (9 items), and Creativity (10 items). Possible responses ranged on a 4-point scale including "seldom or never," "occasionally," "to a considerable degree," and "almost all the time." Reported coefficients of stability are .88 (Learning), .91 (Motivation), and .79 (Creativity) after a three month testing interval (Renzulli, et al., 1976).

Student Activities

One important goal of many gifted programs is to stimulate independent learning through pursuit of special projects (Roeder, Haensly, & Edlind, 1982; Treffinger & Renzulli, 1986). This research included the development and administration of a Student Activities Survey (NRC/GT Staff, 1990). Items pertained to student involvement in both curricular and extracurricular special projects in science, mathematics, humanities, art, and other areas. See Appendix D for a copy of the survey . Data included tallies of the number of types of projects in which the student participated over a two-week period.

Dependent Variables: Affective Outcomes

Affective adjustment was assessed from the multiple perspectives of self-report, as well as parent and teacher input. Attention focused on both problem areas and areas of competence.

Self-perception

This construct was assessed using the Harter Self-Perception Profile for Children (SPPC; Harter, 1985), a revision of the Perceived Competence Scale for Children (Harter, 1982). From the 6-scale instrument (Scholastic Competence, Social Acceptance, Athletic Competence, Physical Appearance, Behavioral Conduct, and Global Self-Worth), this study used the subscales of Scholastic Competence (SC) and Social Acceptance (SA) because they most accurately reflected the intent of this research, an investigation about assessments of academic and affective outcomes. The SC scale taps the child's perception of his or her ability within the field of school-related scholastic performance. Items from the SA scale assess the degree to which the child feels accepted by peers or feels popular. The standardization sample included students from lower middle class to upper middle class communities in Colorado. Approximately 10% of the subjects were non-Caucasian. Results are not reported by racial/ethnic status. For each 6-item scale, scores are based on a 4-point response format with a value of 4 representing the most favorable response. For each item, students were asked to circle the statement that is most like them and were instructed to indicate whether that statement is "really true for me" or "sort of true for me." A sample item for SC contains these sentences: *"Some kids feel that they are very good at their schoolwork"* but *"other kids worry about whether they can do the schoolwork assigned to them."* After reading the directions, the test administrator read each item aloud as the students completed the survey.

Internal consistency coefficients listed in the manual ranged from .80 to .85 for SC and .75 to .80 for SA. Harter (1985) found no systematic effects for grade level or sex of elementary school children on either of the subscales for this study. As reported by Harter (1985), SC and SA are moderately positively correlated ($r = .44$ to $.63$) for children in the third and fourth grades and become less positively correlated as students get older ($r = .24$ to $.34$, grades 6-8). "Thus, it would appear that doing well in school becomes less relevant to one's popularity as one approaches and moves into adolescence" (Harter, 1985, p. 21).

Intrinsic/Extrinsic Motivation

Harter's (1980) index of Intrinsic Versus Extrinsic Orientation in the Classroom was selected to assess student motivation. In order to reduce the test administration time, the length of each subscale was decreased by one item and the subscale of Curiosity/Interest vs. Pleasing the Teacher/Getting Grades was eliminated from the survey. This was accomplished according to advice received from the survey's author, Susan Harter. She recommended dropping the scale and the items with the lowest factor loadings from a factor analytic study reported in the technical manual (Harter, 1980). The following 5-item subscales were administered to all students: Preference for Challenge vs. Preference for Easy Work Assigned (PC), Independent Mastery vs. Pleasing the Teacher (IM), Independent Judgment vs. Reliance on the Teacher's Judgment (IJ), Internal Criteria for Success/Failure vs. External Criteria (IC). A 4-point response format was also used for these scales with 4 representing the most favorable response, indicating an intrinsic orientation. These statements were presented in the same manner as the items for the self-perception scales. The standardization sample contained over 3,000 students in grades 3 through 6 in 4 states representing the western and northeastern regions of the United

States. Harter reported internal consistency reliability estimates ranging from .78 to .84, .68 to .82, .72 to .81, and .75 to .83 for PC, IM, IJ, and IC, respectively.

Behavioral Adjustment

This study employed the parent (Achenbach & Edelbrock, 1983) and teacher (Achenbach & Edelbrock, 1986) versions of the Child Behavior Checklist (CBCL) . The CBCL is an empirically based assessment instrument covering 118 standard problem areas, which are grouped into 8 or 9 specific behavior problem scales (e.g., Anxious, Depressed, Uncommunicative, Obsessive-Compulsive, Somatic Complaints, Social Withdrawal, Hyperactive, Aggressive, and Delinquent). Items were rated on a scale ranging from 0 to 2, with 0 representing the absence of the specific problem. In addition to problem areas, the instrument assesses adaptive behavior and competence in 3 to 5 areas, including social activities and interests, school activities, and other activities (e.g., sports). (The number of CBCL scales varies slightly from teacher to parent report versions). Gallucci (1988) found that the parent and teacher versions of the CBCL are applicable to gifted program students and that means and distributions of gifted program students are similar to established norms. Extensive reliability and validity studies for both forms are reported elsewhere (Achenbach, 1987; Achenbach & Edelbrock, 1981, 1983, 1986; Edelbrock, Greenbaum, & Conover, 1985; Reed & Edelbrock, 1983). Results were reported only for the first round of data collection for three reasons. First, the instruments were too time-consuming to continue their administration for all four data collection periods. Second, parents and teachers objected to completing the surveys because they thought the items only focused on the negative aspects of student behavior, with 120 items referring to student problems. Third, a follow-up administration of the instruments in the spring of 1992 yielded extremely poor return rates (3% for teachers and 29% for parents).

Control Variables

Two control variables were employed in these analyses. First, round one scores were used to control for initial differences on each variable. Second, differential effects on economically disadvantaged students were examined using the Hollingshead four-factor index (Hollingshead, 1975). The factors of sex, marital status, education, and profession are considered to reflect a family's status in society. Educational level spans seven categories from "less than seventh [grade]" to "graduate professional training (graduate degree)." Occupation is scored on a 9-step scale from unskilled laborers having a rating of 1 to professionals having the highest rating. Hollingshead provides the following formula for combining these data: level of occupation x 5 + level of education x 3. When the family consists of two individuals who are gainfully employed such as both parents, the formula is estimated twice and averaged. The author reports computed scores ranging from 8 to 66. He also provides an analysis of income in relation to this variable (Hollingshead, 1975).

Since school personnel are not given the authority to release information related to a family's financial status, these data were collected via self-report from parents in a family demographics form sent for each round of the study. Completed data were received from 741 of the 1,010 participating families with scores ranging from 10 to 66, with a mean of 43.52.

Procedures

All data collection procedures received prior approval from the University of Virginia Human Subjects Research Committee. Schools implemented their regular identification schemes for selecting students for their gifted programs. After students were selected for the program, parents and students were contacted by letter and asked for permission to be included in the study. Participating students were assessed through multiple administrations of an achievement test, an attitude toward learning processes scale, a self-perception inventory, and an intrinsic/extrinsic motivation survey. Instruments were administered in the fall and spring of the 1990-1991 and 1991-1992 academic years. Testing coordinators at each site received thorough instruction in test administration, including scripts for providing student directions. The recommended testing period consisted of two time blocks of two hours each and all students were tested at school during the regular school day. Parents received their instruments (family demographics form, Student Activities Survey, and parent version of the Child Behavior Checklist) through the mail and returned their responses in self-addressed stamped envelopes. The teachers primarily responsible for the student's instruction completed the teacher version of the Child Behavior Checklist and the rating scales.

Data Analyses

Data were cleaned and coded using standard procedures. The main framework for statistical analyses was a series of analyses of covariance (ANCOVAs) procedures which controlled for baseline adjustment, as recommended by Cook & Campbell (1979). For the first research question, main effects across the gifted program types (Special School, Separate Class, Pull-Out, Within-Class) and racial/ethnic status (Caucasian and African-American) were examined using learning outcome measures at the end of year 2, after controlling for baseline assessment and social status. Subsequent ANCOVAs were employed to examine the second research question looking across all six levels of program type (four gifted program types and two comparison groups). Analysis of covariance procedures were also used to examine mean differences for the variables of attitudes toward learning, teacher ratings, and behavioral adjustment. For attitudes toward learning and teacher ratings, only the main effect for program type was investigated after controlling for initial differences on each variable. Main effects for sex and educational status (gifted and nongifted) were examined regarding first round scores of the behavioral adjustment of students after covarying for the effects of grade level (grade 2 and grade 3) and racial/ethnic status (Caucasian and non-Caucasian). Question #3 examined spring 1991 and fall 1991 scores using a mixed factorial design employing a three-factor ANCOVA (program type x racial/ethnic status x test administration) with repeated measures on the last dimension. Follow-up investigations for all analyses compared mean differences using Student-Newman-Keuls procedures (Tabachnick & Fidell, 1989). Primary procedures were conducted using a mainframe version of SPSS (*SPSS Reference Guide*, 1990). Variables included in these analyses are listed in Table 5.

Because of the complexity of the design- for example, each school program is naturally and unavoidably nested within a program type and four rounds of data collection provide many opportunities for comparing data sets over time. First, a comparison was made among students in the four types of gifted programs. Second, each of the four gifted programs was compared to the two comparison groups. Third, achievement over the summer break was analyzed. Finally, a follow-up series of analyses compared individual programs within program types. This final set of analyses had only exploratory value.

CHAPTER 4: Results

This chapter summarizes the results of the longitudinal study assessing elementary school student cognitive and affective learning outcomes across program type and ethnic status. First, analyses are provided for eighteen variables included in the study (5 achievement tests, 2 estimates of self-perception, 4 measures of motivation, 1 assessment of attitudes toward learning, 3 teacher rating scales, 1 student activities survey, and 2 assessments of behavioral adjustment), comparing students across program types over time. Second, an examination of the changes in achievement over the summer break is presented. Finally, differences are reported in academic ability for programs within program types.

The Learning Outcomes Study: Longitudinal Results

This section includes three sets of results using univariate analyses of covariance (ANCOVA) with Student-Newman-Keuls post hoc comparisons. For each research question, separate analyses were performed for the measures of achievement, self-perception, and intrinsic/extrinsic motivation. The variables of attitudes toward learning and teacher ratings were not analyzed using the covariate of social status since matching across these variables would have dramatically reduced the sample size. In addition, Hispanic, Asian-American, and Native-American students could not be included in these statistical procedures due to small sample size for each category. Primary analyses represent fourth round comparisons (spring 1992) on adjusted means after controlling for social status and initial differences on first round scores (fall 1990). The independent variables were program type and racial/ethnic status. Employing the hierarchical model of analysis outlined in the methodology section of Chapter 3, the first research question addresses comparisons across the four groups of students in different programs for the gifted. This sample contained a total of 287 students in grades 2 and 3. Research question #2 adds the two comparison groups (gifted students who are in districts where no program is available and nongifted students). The sample size was 442. Separate analyses were conducted for the attitudes toward learning measure, the teacher rating scales, the student activities inventory, and the behavioral adjustment checklist. Research Question #3 examined spring 1991 and fall 1991 scores using a mixed factorial design employing a three-factor ANCOVA (program type x racial/ethnic status x test administration) with repeated measures on the last dimension. Follow-up investigations compared mean differences using Student-Newman-Keuls procedures. Primary procedures were conducted using a mainframe version of SPSS.

Research Question #1: Are there significant differences between program types (strategies)?

Achievement. The reader might find it useful to compare the means for each group to two benchmarks of grade equivalent score interpretation, the 50th and 90th percentiles for the national standardization sample. For each achievement subscale, these values are listed in Appendix E.

Differences in program type and racial/ethnic status were found in all areas of achievement. The following levels of significance were recorded for program type: Mathematics Concepts ($F = 10.89$, $df = 3, 277$, $p < .001$); Mathematics Problem-Solving ($F = 9.97$, $df = 3, 276$, $p < .001$); Reading Comprehension, ($F = 9.34$, $df = 3, 267$, $p < .001$); Science ($F = 6.08$, df = 3, 252, $p < .001$); and Social Studies ($F = 10.76$, $df = 3$,

253, $p < .001$). Means and adjusted means for all subscales are located in Table 6. Results of follow-up post hoc analyses indicated that for Mathematics Concepts, Reading Comprehension, and Social Studies, students in Pull-Out, Separate Class, and Special School programs had significantly higher scores than their counterparts from Within-Class programs. In Mathematics Problem Solving, scores from students in Pull-Out and Separate Class programs were higher than those from Within-Class program students. Students in Pull-Out programs also had higher scores than those from Special Schools regarding Mathematics Problem Solving. In addition, Pull-Out program students had higher scores than those from Within-Class programs for the Science subscale. These comparisons of means indicate that students from Within-Class programs have significantly lower achievement scores after two years in a program for the gifted than students in other types of programs. Refer to Appendix F for a table describing these outcomes.

Significant main effects for racial/ethnic status occurred for Mathematics Concepts ($F = 10.62$, $df = 1, 277$, $p < .001$), Mathematics Problem-Solving ($F = 14.76$, $df = 1, 276$, $p < .001$), Reading Comprehension ($F = 14.26$, $df = 1, 267$, $p < .001$), Science ($F = 13.84$, $df = 1, 252$, $p < .001$), and Social Studies ($F = 20.12$, $df = 1, 253$, $p < .001$). In all cases, after covarying for first round scores and social status, scores for Caucasian students were significantly higher than those for African-American students. Means for racial/ethnic status can be found in Table 7.

Self-perception. There were no significant main effects for program type or racial/ethnic status (Caucasian: Mean = 2.98, $n = 201$; African-American: Mean = 3.04, $n = 68$) with respect to Social Acceptance. Significant differences were found across the four gifted programs with respect to Scholastic Competence. ($F = 9.60$, $df = 3, 257$, $p < .001$). Students in Pull-Out and Within-Class programs were significantly more positive about their scholastic capabilities than were their peers in Separate Class programs. Those from Pull-Out programs also had significantly higher scores than students from Special School settings. Table 8 contains mean values for all groups and follow-up comparisons are located in Appendix F. There were no significant differences between the scores of Caucasian (Mean = 3.32, $n = 198$) and African-American students (Mean = 3.29, $n = 69$) in programs for the gifted with respect to Scholastic Competence. See Table 9 for all mean values related to ethnic status.

Intrinsic/extrinsic motivation. There were no significant differences among the four gifted programs with respect to Independent Judgment vs. Reliance on the Teacher's Judgment (IJ) and Internal Criteria for Success/Failure vs. External Criteria (IC). Main effects for program type were found for Preference for Challenge vs. Preference for Easy Work Assigned (PC) ($F = 4.85$, $df = 3, 256$, $p < .01$), Independent Mastery vs. Pleasing the Teacher (IM) ($F = 4.75$, $df = 3, 259$, $p < .01$). See Table 10 for Mean values. Students from Pull-Out and Within-Class programs preferred challenges (PC) and working on their own (IM) to a greater degree than their peers in Separate Class programs. Results of post hoc analyses for these variables are detailed in Appendix F.

A main effect for racial/ethnic status was found for PC ($F = 4.90$, $df = 1, 256$, $p < .05$) with Caucasian students (Mean = 3.33, $n = 196$) having significantly higher scores than African-American students (Mean = 3.00, $n = 70$). No other mean differences were found for the independent variable of ethnic status (see Table 11).

Table 6

Achievement Scores for the Iowa Tests of Basic Skills Across Four Levels of Program Type[a]

	Special School		Separate Class		Pull-Out		Within-Class	
Subscales	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)
Mathematics Concepts								
	n = 42		n = 53		n = 97		n = 95	
Fall 1990	36.60	7.90	36.40	10.17	33.92	7.01	31.22	7.51
Spring 1992	49.95	14.30	57.45	13.38	57.14	10.58	45.44	12.53
Adjusted Mean	51.08		54.49		53.41		45.93	
Mathematics Problem Solving								
	n = 42		n = 52		n = 97		n = 95	
Fall 1990	37.08	9.04	36.58	9.60	33.80	8.93	31.73	8.25
Spring 1992	46.57	11.70	54.62	11.28	54.77	9.83	44.96	11.89
Adjusted Mean	47.37		51.33		51.94		44.40	
Reading Comprehension								
	n = 42		n = 54		n = 87		n = 94	
Fall 1990	40.51	11.48	41.41	11.80	37.01	12.18	32.98	10.38
Spring 1992	53.25	10.91	53.78	12.68	54.40	10.24	43.12	13.01
Adjusted Mean	51.85		51.88		54.93		45.88	
Science								
	n = 41		n = 52		n = 76		n = 93	
Fall 1990	37.08	14.42	41.09	15.34	39.50	17.35	31.91	16.21
Spring 1992	53.41	15.75	63.52	16.49	67.14	15.60	53.15	16.89
Adjusted Mean	57.73		57.66		61.15		52.48	
Social Studies								
	n = 42		n = 53		n = 75		n = 93	
Fall 1990	40.81	20.50	44.29	16.03	37.69	15.36	33.36	13.98
Spring 1992	55.50	15.87	69.34	18.40	65.68	17.29	50.85	17.63
Adjusted Mean	58.36		62.70		60.94		50.52	

Note: A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

Table 7

Iowa Tests of Basic Skills Achievement Scores for Racial/Ethnic Status for Four Levels of Program Type[a]

	African-American		Caucasian	
Subscales	Mean	(s.d.)	Mean	(s.d.)
Mathematics Concepts				
	n = 80		n = 207	
Fall 1990	31.68	8.03	37.39	8.26
Spring 1992	44.54	10.93	55.27	14.46
Adjusted Mean	48.69		53.77	
Mathematics Problem Solving				
	n = 79		n = 207	
Fall 1990	31.11	8.85	38.47	9.06
Spring 1992	42.72	11.04	53.16	11.24
Adjusted Mean	46.38		51.14	
Reading comprehension				
	n = 79		n = 198	
Fall 1990	33.34	9.65	42.62	13.26
Spring 1992	45.91	11.50	56.36	11.91
Adjusted Mean	48.47		53.80	
Science				
	n = 78		n = 184	
Fall 1990	29.73	15.16	45.06	16.50
Spring 1992	48.01	16.90	64.10	15.47
Adjusted Mean	52.59		61.92	
Social Studies				
	n = 76		n = 187	
Fall 1990	34.79	15.18	43.28	17.76
Spring 1992	48.99	17.61	63.84	16.99
Adjusted Mean	52.71		63.54	

Note: A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

Table 8

Scores for the Self-Perception Profile for Children Across Four Levels of Program Type[a]

	Special School		Separate Class		Pull-Out		Within-Class	
Subscales	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)
Scholastic Competence								
	n = 37		n = 46		n = 96		n = 88	
Fall 1990	3.19	.74	3.28	.63	3.29	.61	3.15	.63
Spring 1992	3.14	.60	2.93	.77	3.45	.56	3.38	.54
Adjusted Mean	3.28		3.00		3.48		3.45	
Social Acceptance								
	n = 34		n = 49		n = 98		n = 88	
Fall 1990	2.89	.53	2.74	.76	2.99	.77	2.95	.73
Spring 1992	3.09	.78	2.76	.79	2.99	.75	3.06	.61
Adjusted Mean	3.09		2.96		2.91		3.09	

Note: Scores are based on a 4-point response format.

[a] Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

Table 9

Self-Perception Profile for Children Scores Depicting Differences in Racial/Ethnic Status for Four Levels of Program Type[a]

	African-American		Caucasian	
Subscales	Mean	(s.d.)	Mean	(s.d.)
Scholastic Competence				
	n = 69		n = 198	
Fall 1990	3.27	.63	3.19	.62
Spring 1992	3.25	.65	3.31	.58
Adjusted Mean	3.29		3.32	
Social Acceptance				
	n = 68		n = 201	
Fall 1990	2.98	.74	2.81	.65
Spring 1992	3.10	.70	2.94	.76
Adjusted Mean	3.04		2.98	

Note: Scores are based on a 4-point response format.

[a] Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

Table 10

Scores for the Intrinsic Versus Extrinsic Orientation in the Classroom Scale Across Four Levels of Program Type[a]

	Special School		Separate Class		Pull-Out		Within-Class	
Subscales	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)
Internal Criteria								
	n = 39		n = 47		n = 96		n = 91	
Fall 1990	2.49	.75	2.65	.92	2.49	.89	2.19	.87
Spring 1992	2.90	.67	2.79	.84	3.11	.78	2.82	.96
Adjusted Mean	3.10		2.79		2.95		2.90	
Independent Judgment								
	n = 37		n = 46		n = 98		n = 85	
Fall 1990	2.04	.79	2.42	.86	2.04	.66	1.93	.75
Spring 1992	2.82	.85	2.76	.96	2.65	.84	2.66	.88
Adjusted Mean	2.91		2.61		2.66		2.78	
Independent Mastery								
	n = 40		n = 44		n = 95		n = 90	
Fall 1990	3.27	.73	3.38	.64	3.30	.64	3.24	.64
Spring 1992	3.19	.71	3.07	.77	3.49	.55	3.32	.64
Adjusted Mean	3.35		3.09		3.51		3.37	
Preference for Challenge								
	n = 36		n = 48		n = 93		n = 89	
Fall 1990	3.20	.94	3.13	.96	3.28	.67	3.31	.66
Spring 1992	3.20	.75	2.97	.80	3.48	.68	3.20	.74
Adjusted Mean	3.20		2.92		3.30		3.23	

Note: Scores are based on a 4-point response format.

[a] Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

Table 11

Intrinsic Versus Extrinsic Orientation in the Classroom Scores Depicting Differences in Racial/Ethnic Status for Four Levels of Program Type[a]

	African-American		Caucasian	
Subscales	Mean	(s.d.)	Mean	(s.d.)
Internal Criteria				
	n = 73		n = 200	
Fall 1990	2.38	.94	2.53	.77
Spring 1992	2.81	.89	3.07	.73
Adjusted Mean	2.84		3.03	
Independent Judgment				
	n = 66		n = 200	
Fall 1990	2.10	.74	2.12	.80
Spring 1992	2.69	.93	2.73	.86
Adjusted Mean	2.72		2.77	
Independent Mastery				
	n = 75		n = 194	
Fall 1990	3.25	.70	3.34	.63
Spring 1992	3.26	.72	3.34	.61
Adjusted Mean	3.32		3.34	
preference of Challenge				
	n = 70		n = 196	
Fall 1990	3.28	.73	3.18	.88
Spring 1992	3.03	.82	3.31	.67
Adjusted Mean	3.00		3.33	

Note: Scores are based on a 4-point response format.

[a] Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

Research Question #2: Do any of the program types have differential effects on traditionally underserved populations of gifted and nongifted students?

These results represent fourth round group comparisons across program type (the four program types for high ability students and the two comparison groups) and racial/ethnic status (African-American and Caucasian) based on adjusted means after controlling for first round scores and social status as calculated by the Hollingshead Index (1975).

Achievement. Significant differences in program type were found in all areas of achievement: Mathematics Concepts ($F = 7.84$, $df = 5, 428$, $p < .001$); Mathematics Problem-Solving ($F = 10.55$, $df = 5, 426$, $p < .001$); Reading Comprehension, ($F = 7.37$, $df = 5, 403$, $p < .001$); Science ($F = 5.16$, $df = 5, 389$, $p < .001$); and Social Studies ($F = 7.79$, $df = 5, 394$, $p < .001$). Means and adjusted means for all subscales are located in Table 12. For Mathematics Concepts, students from Separate Class, Pull-Out, and Special School program, as well as those from the Nongifted Comparison Group performed better than students from the Gifted Comparison Group and from Within-Class program. In Mathematics Problem Solving, students from the Separate Class program and the Nongifted Comparison Group had higher scores than those from the Gifted Comparison Group and the Within-Class program. Those from the Pull-Out program had higher scores than students from the Gifted Comparison Group, Within-Class program, Special School program, and Nongifted Comparison Group. Students from Special Schools had higher scores than students from the Gifted Comparison Group. In Reading Comprehension, Pull-Out program students scored higher than their peers from Within-Class programs, the Gifted Comparison Group, and the Nongifted Comparison Group. In addition, student scores from Special School and Separate Class programs were higher than scores from students attending Within-Class programs and students from Special Schools had higher Reading Comprehension scores than their counterparts in the Gifted Comparison Group. Science achievement scores were higher for students from Pull-Out, Special School, and Separate Class programs as compared to students from the Gifted Comparison Group. In addition, children from Pull-Out programs had higher scores than children from the Within-Class program and the Nongifted Comparison Group for Science. Finally, in the area of Social Studies, students from Separate Class and Pull-Out programs performed better than their peers in Within-Class programs and both comparison groups. For Social Studies, Special School students had higher scores than those from the Within-Class program. Follow-up post hoc analyses, including the levels of statistical significance, are reported in Appendix G.

In the areas of Reading Comprehension, Science, and Social Studies, students from the Special School, Separate Class, and Pull-Out programs had the highest achievement scores, often significantly higher, than their peers from the Within-Class program and both of the comparison groups. The mathematics subtests provided different results. The nongifted children performed significantly better in Mathematics Concepts and Mathematics Problem Solving than the children from the Gifted Comparison Group and the gifted children participating in the Within-Class programs. This may mean that these gifted students were not originally selected for their ability in mathematics. This situation could have occurred if these second and third grade students had originally been identified based on early reading and language abilities and not their visual-spatial and number abilities. In the case of students from the Within-Class program, if the gifted students had been selected for their general intellectual ability including a component that reflects mathematics, the results of this study could mean that gifted students participating in these programs were missing information in mathematics that they needed in order to perform well on a standardized achievement test.

Table 12

Achievement Scores From the Iowa Tests of Basic Skills for Six Levels of Program Type[a]

Subscales	Special School Mean	(s.d.)	Separate Class Mean	(s.d.)	Pull-Out Mean	(s.d.)	Within-Class Mean	(s.d.)	Gifted Comparison Group Mean	(s.d.)	Nongifted Comparison Group Mean	(s.d.)
Mathematics Concepts												
	n = 42		n = 53		n = 97		n = 95		n = 47		n = 108	
Fall 1990	36.60	7.90	36.40	10.17	33.92	7.01	31.22	7.51	28.80	6.53	26.78	7.28
Spring 1992	49.95	14.30	57.45	13.38	57.14	10.58	45.44	12.53	45.53	12.74	46.65	11.53
Adjusted Mean	48.67		52.08		51.12		43.77		40.63		48.78	
Mathematics Problem Solving												
	n = 42		n = 52		n = 97		n = 95		n = 46		n = 108	
Fall 1990	37.08	9.04	36.58	9.60	33.80	8.93	31.73	8.25	28.22	11.47	26.32	8.69
Spring 1992	46.57	11.70	54.62	11.28	54.77	9.83	44.96	11.89	42.33	13.71	45.29	11.77
Adjusted Mean	45.58		49.56		50.28		42.82		40.28		47.05	
Reading Comprehension												
	n = 42		n = 54		n = 87		n = 94		n = 47		n = 93	
Fall 1990	40.51	11.48	41.41	11.78	37.01	12.18	32.98	10.38	24.14	13.19	27.96	11.85
Spring 1992	53.25	10.91	53.78	12.68	54.40	10.24	43.12	13.01	37.77	14.66	41.29	13.57
Adjusted Mean	49.16		49.12		52.51		43.76		43.97		45.09	

Note: A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

Table 12 (continued)

Achievement Scores From the Iowa Tests of Basic Skills for Six Levels of Program Type[a]

Subscales	Special School Mean	(s.d.)	Separate Class Mean	(s.d.)	Pull-Out Mean	(s.d.)	Within-Class Mean	(s.d.)	Gifted Comparison Group Mean	(s.d.)	Nongifted Comparison Group Mean	(s.d.)
Science												
	n = 41		n = 52		n = 76		n = 93		n = 47		n = 94	
Fall 1990	37.08	14.42	41.09	15.34	39.50	17.35	31.91	16.21	25.11	13.85	22.82	11.86
Spring 1992	53.41	15.75	63.52	16.49	67.14	15.60	53.15	16.89	50.06	22.51	50.05	16.94
Adjusted Mean	55.69		55.32		58.90		50.63		47.25		51.76	
Social Studies												
	n = 42		n = 53		n = 75		n = 93		n = 47		n = 98	
Fall 1990	40.81	20.50	44.29	16.03	37.69	15.36	33.36	13.98	26.44	15.48	28.26	12.94
Spring 1992	55.50	15.87	69.34	18.40	65.68	17.29	50.85	17.63	54.02	19.49	49.88	15.06
Adjusted Mean	56.24		60.37		58.99		48.83		49.98		50.57	

Note: A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

Across all areas of achievement, significant differences were found in racial/ethnic status (African-Americans and Caucasian): Mathematics Concepts ($F = 13.06$, $df = 1, 428$, $p < .001$); Mathematics Problem Solving ($F = 11.43$, $df = 1, 426$, $p < .001$); Reading Comprehension, ($F = 11.12$, $df = 1, 403$, $p < .001$); Science ($F = 10.71$, $df = 1, 389$, $p < .001$); and Social Studies ($F = 19.02$, $df = 1, 394$, $p < .001$). For all subtests, Caucasian students scored higher than African-American students. Group means for ethnic status are located in Table 13.

Self-perception. There were no significant main effects across the six groups (four gifted programs and two comparison groups) or across racial/ethnic status (Caucasian: Mean = 3.00, $n = 321$; African-American: Mean = 2.94, $n = 101$) with respect to Social Acceptance. There was no significant main effect for racial/ethnic status (Caucasian: Mean = 3.32, $n = 318$; African-American: Mean = 3.28, $n = 102$) with respect to Scholastic Competence. Table 14 contains the means for racial/ethnic status. There was, however, a significant main effect for program type ($F = 3.29$, $df = 5, 406$, $p < .001$) for Scholastic Competence. Table 15 provides the means and standard deviations used to calculate main effects for program type. Refer to Appendix G for details of the Student-Newman-Keuls post hoc analyses. Students from all groups felt more competent with their scholastic abilities than did the students from Separate Classroom programs.

Intrinsic/extrinsic motivation. There were no significant main effects for racial/ethnic status on any of the variables of the Intrinsic Versus Extrinsic Orientation in the Classroom scale (see Table 16 for mean values). No significant differences across the six groups (four gifted programs and the two comparison groups) were found with respect to Internal Criteria for Success/Failure vs. External Criteria (IC). The following variables revealed significant main effects for program type: Independent Judgment vs. Reliance on the Teacher's Judgment (IJ) ($F = 2.70$, $df = 5, 407$, $p < .05$), Independent Mastery vs. Pleasing the Teacher (IM) ($F = 2.94$, $df = 5, 417$, $p < .05$) and Preference for Challenge vs. Preference for Easy Work Assigned (PC) ($F = 3.42$, $df = 5, 409$, $p < .01$). Table 17 contains the values employed in these analyses for program type. Results from post hoc comparisons of adjusted means using Student-Newman-Keuls procedures are reported in Appendix G. Nongifted students reported being less likely to want to make judgments about what to do in school (IJ) when compared to their gifted peers from Special School and Within-Class programs. Students from Separate Class programs were less likely to prefer working on their own (IM) than their nongifted peers and those from Within-Class and Pull-Out programs. For the scale of Independent Mastery, students from Pull-Out programs also had higher scores than their counterparts from the Gifted Comparison Group. Students from Separate Class programs reported being less likely to engage in challenging classwork (PC) than all other students.

Attitudes toward learning. These analyses employ ANCOVAs that include one independent variable, program type, and one covariate, initial differences in affect and achievement. After a 2-year period, scores for all students were above average. From a total of 60 points on a 4-point scale, group means ranged from 34.01 to 37.72. A significant F value was found for program type ($F = 2.25$, $df = 5, 711$, $p < .05$). Students in Special Schools expressed more positive attitudes toward learning than students in all other groups except those in the Gifted Comparison Group. Refer to Table 18 for descriptive data and to Appendix G for detailed results of the follow-up analyses.

Table 13

Iowa Tests of Basic Skills Achievement Scores for Racial/Ethnic Status for Six Levels of Program Type[a]

	African-American		Caucasian	
Subscales	Mean	(s.d.)	Mean	(s.d.)
Mathematics Concepts				
	n = 99		n = 343	
Fall 1990	29.13	7.49	35.17	7.98
Spring 1992	43.12	11.06	52.22	13.96
Adjusted Mean	44.56		50.47	
Mathematics Problem Solving				
	n = 98		n = 342	
Fall 1990	28.32	8.28	36.26	9.04
Spring 1992	50.03	12.34	41.91	11.00
Adjusted Mean	44.00		47.85	
Reading comprehension				
	n = 97		n = 320	
Fall 1990	29.40	10.76	38.60	12.86
Spring 1992	42.29	12.65	52.24	12.37
Adjusted Mean	45.19		49.35	
Science				
	n = 98		n = 305	
Fall 1990	25.36	13.11	40.48	16.57
Spring 1992	46.60	18.07	59.11	16.66
Adjusted Mean	49.50		56.98	
Social Studies				
	n = 95		n = 313	
Fall 1990	30.50	14.27	39.78	17.05
Spring 1992	47.52	17.24	59.34	17.82
Adjusted Mean	49.31		59.02	

Note: A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

Table 14

Self-Perception Profile for Children Scores Depicting Differences in Racial/Ethnic Status for Six Levels of Program Type[a]

	African-American		Caucasian	
Subscales	Mean	(s.d.)	Mean	(s.d.)
Scholastic Competence				
	n = 102		n = 318	
Fall 1990	3.23	.58	3.24	.60
Spring 1992	3.25	.65	3.31	.58
Adjusted Mean	3.28		3.32	
Social Acceptance				
	n = 101		n = 321	
Fall 1990	2.97	.66	2.85	.62
Spring 1992	3.06	.69	2.97	.70
Adjusted Mean	3.00		2.94	

Note: Scores are based on a 4-point response format.

[a] Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

Table 15

Scores From the Self-Perception Profile for Children Across Six Levels of Program Type[a]

Subscales	Special School Mean	(s.d.)	Separate Class Mean	(s.d.)	Pull-Out Mean	(s.d.)	Within-Class Mean	(s.d.)	Gifted Comparison Group Mean	(s.d.)	Nongifted Comparison Group Mean	(s.d.)
Scholastic Competence												
	n = 37		n = 46		n = 96		n = 88		n = 40		n = 113	
Fall 1990	3.19	.64	3.28	.63	3.29	.61	3.15	.63	3.43	.43	3.10	.62
Spring 1992	3.14	.60	2.93	.77	3.45	.56	3.38	.54	3.50	.39	3.23	.66
Adjusted Mean	3.28		3.00		3.48		3.45		3.29		3.29	
Social Acceptance												
	n = 34		n = 49		n = 98		n = 88		n = 40		n = 113	
Fall 1990	2.89	.53	2.74	.76	2.99	.77	2.95	.73	3.08	.44	2.80	.62
Spring 1992	3.09	.78	2.76	.79	2.99	.75	3.06	.61	3.56	.63	2.99	.65
Adjusted Mean	3.09		2.96		2.91		3.09		2.71		3.04	

Note: Scores are based on a 4-point response format.

[a] Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

Table 16

Intrinsic Versus Extrinsic Orientation in the Classroom Scores Depicting Differences in Racial/Ethnic Status for Six Levels of Program Type[a]

	African-American		Caucasian	
Subscales	Mean	(s.d.)	Mean	(s.d.)
Internal Criteria				
	n = 104		n = 325	
Fall 1990	2.36	.85	2.55	.80
Spring 1992	2.78	.79	2.99	.77
Adjusted Mean	2.82		2.96	
Independent Judgment				
	n = 101		n = 320	
Fall 1990	2.07	.74	2.10	.76
Spring 1992	2.64	.89	2.58	.81
Adjusted Mean	2.69		2.67	
Independent Mastery				
	n = 110		n = 321	
Fall 1990	3.38	.58	3.33	.62
Spring 1992	3.28	.64	3.35	.63
Adjusted Mean	3.30		3.36	
preference of Challenge				
	n = 105		n = 318	
Fall 1990	3.33	.63	3.20	.83
Spring 1992	3.10	.76	3.29	.70
Adjusted Mean	3.11		3.32	

Note: Scores are based on a 4-point response format.

[a] Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

Table 17

Scores for the Intrinsic Versus Extrinsic Orientation in the Classroom Scale Across Six Levels of Program Type[a]

Subscales	Special School Mean	(s.d.)	Separate Class Mean	(s.d.)	Pull-Out Mean	(s.d.)	Within-Class Mean	(s.d.)	Gifted Comparison Group Mean	(s.d.)	Nongifted Comparison Group Mean	(s.d.)
Internal Criteria												
	n = 39		n = 47		n = 96		n = 91		n = 43		n = 113	
Fall 1990	2.49	.75	2.65	.92	2.49	.89	2.19	.87	2.56	.68	2.34	.83
Spring 1992	2.90	.67	2.79	.84	3.11	.78	2.82	.96	2.95	.54	2.73	.74
Adjusted Mean	3.10		2.79		2.95		2.90		2.78		2.79	
Independent Judgment												
	n = 37		n = 46		n = 98		n = 85		n = 40		n = 115	
Fall 1990	2.04	.79	2.42	.86	2.04	.66	1.93	.75	2.16	.83	1.93	.62
Spring 1992	2.82	.85	2.76	.96	2.65	.84	2.66	.88	2.66	.84	2.34	.71
Adjusted Mean	2.91		2.61		2.65		2.78		2.70		2.43	
Independent Mastery												
	n = 40		n = 44		n = 95		n = 90		n = 42		n = 120	
Fall 1990	3.27	.73	3.38	.64	3.30	.64	3.24	.64	3.70	.29	3.24	.65
Spring 1992	3.19	.71	3.07	.77	3.49	.55	3.32	.64	3.37	.55	3.34	.60
Adjusted Mean	3.36		3.11		3.53		3.39		3.23		3.37	

Note: Scores are based on a 4-point response format.

[a] Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

Table 17 (continued)

Scores for the Intrinsic Versus Extrinsic Orientation in the Classroom Scale Across Six Levels of Program Type[a]

Subscales	Special School Mean	(s.d.)	Separate Class Mean	(s.d.)	Pull-Out Mean	(s.d.)	Within-Class Mean	(s.d.)	Gifted Comparison Group Mean	(s.d.)	Nongifted Comparison Group Mean	(s.d.)
Preference for Challenge												
	n = 36		n = 48		n = 93		n = 89		n = 40		n = 117	
Fall 1990	3.20	.94	3.13	.96	3.28	.67	3.31	.66	3.61	.44	3.08	.73
Spring 1992	3.02	.75	2.97	.80	3.48	.68	3.20	.74	3.38	.71	3.21	.68
Adjusted Mean	3.20		2.92		3.30		3.23		3.35		3.26	

Note: Scores are based on a 4-point response format.

[a] Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

Table 18

Scores for the Attitudes Toward Learning Processes Scale Across Six Levels of Program Type[a]

Subscale	Special School		Separate Class		Pull-Out		Within-Class		Gifted Comparison Group		Nongifted Comparison Group	
	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)
	n = 91		n = 86		n = 154		n = 135		n = 55		n = 197	
Fall 1990	41.75	7.88	36.04	9.34	33.64	8.20	37.93	7.14	38.02	8.69	35.83	7.29
Spring 1992	39.07	8.48	33.66	9.55	33.24	9.22	34.76	9.47	35.31	8.51	33.96	8.83
Adjusted Mean	37.72		34.01		34.29		34.55		35.07		34.36	

Note: These are summed scores, based on a scale with 15 items and a 4-point response format.

[a] Values are based on procedures comparing first round scores after adjusting for initial differences in social status.

Teacher Ratings. These analyses employ ANCOVAs that include one independent variable, program type, and one covariate, initial differences in affect and achievement. Significant differences in program type were found in all areas of teacher ratings: Learning ($F = 5.06$, $df = 5, 647$, $p < .001$), Creativity ($F = 2.36$, $df = 5, 636$, $p < .05$), and Motivation ($F = 3.84$, $df = 5, 639$, $p < .01$). Table 19 contains means and adjusted mean values, while details of the post hoc comparisons for each variable across programs are in Appendix G. Scores from the Learning subscale showed that ratings of teachers from Pull-Out and Within-Class programs, as well as ratings from the Gifted Comparison Group were higher than ratings of students in Special Schools. Teachers from Pull-Out programs also had higher Learning ratings of students than teachers from Separate Class programs and the Nongifted Comparison Group. For Creativity, teacher ratings from Within-Class and Pull-Out programs were higher than those from Special School teachers. Finally, teachers from the Pull-Out and Within-Class programs and both comparison groups had higher student ratings of motivation than the teachers from Special School programs. For all three variables, teachers appear to give consistently lower ratings to students from Special Schools.

Student activities survey. Data included tallies of the number of types of activities in which the students participated over a two-week period. Descriptive results from the spring of 1991 and the spring of 1992 can be found in Table 20. Since there were discrepancies with the way in which the forms were completed- some respondents writing carefully detailed descriptions of their child's projects and others providing more general remarks -only tallies of types of projects are reported in these results. For example, parents and children were asked to respond to the following question: "Has your child ever submitted an original piece of work (such as a poem or article) to a magazine, journal, newspaper, etc.? __Yes __No If yes, please describe your child's work and where it was submitted. Indicate the source of the project (school assignment, special program project, child's individual interest, or other activity)." One parent of a child from a Separate Class program placed an X next to "Yes" and wrote "poem - school newspaper." In contrast, a parent of a child from a Special School program also indicated "Yes" to this question and provided more details about the project by writing "A poem submitted to a children['s] newsletter (monthly). The poem is about friendship and life, her title is 'We go faster and faster around the merry go round.' Her poem is her own interest." Appendix D contains the entire survey. Subjects in all groups participated in a similar number of types of activities during the spring of 1991 and the spring of 1992.

Behavioral Adjustment. The adjustment of gifted learners was assessed during the fall of 1990. An overview of these findings will be presented here. Refer to a paper presentation by Cornell, Delcourt, Bland, Goldberg, and Oram (1994) for a more detailed description of the analyses and discussion of the results.

A balanced assessment of affective adjustment requires both the student's subjective perception of competence and well-being (self-concept) and a relatively more objective description of the student's behavior. Accordingly, the parent (Achenbach & Edelbrock, 1983) and teacher (Achenbach & Edelbrock, 1986) versions of the Child Behavior Checklist (CBCL) were used to investigate the incidence of adjustment problems among elementary school students placed in gifted programs. Two main questions were addressed: (a) What is the incidence of behavior problems among elementary students selected for gifted programs?; and (b) How do gifted education students with behavior problems differ from regular education students with behavior problems?

Table 19

Scores for the Scale for Rating Behavioral Characteristics of Superior Students Across Six Levels of Program Type[a]

	Special School		Separate Class		Pull-Out		Within-Class		Gifted Comparison Group		Nongifted Comparison Group	
Subscales	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)
Creativity												
	n = 95		n = 80		n = 120		n = 132		n = 50		n = 166	
Fall 1990	24.11	7.07	19.69	6.89	20.38	6.72	23.59	7.56	22.88	8.95	19.80	7.06
Spring 1992	23.99	8.78	23.80	7.00	25.43	7.56	27.00	7.67	26.00	7.91	24.87	7.94
Adjusted Mean	23.26		24.48		25.85		26.44		25.65		25.47	
Learning												
	n = 95		n = 81		n = 122		n = 136		n = 54		n = 166	
Fall 1990	19.53	6.02	18.28	6.17	19.73	6.52	22.25	6.30	20.98	7.02	18.96	6.48
Spring 1992	20.21	7.46	20.69	6.13	23.85	6.45	23.94	6.07	24.06	6.45	21.47	6.83
Adjusted Mean	20.41		21.46		23.96		22.88		23.58		21.93	
Motivation												
	n = 95		n = 81		n = 121		n = 132		n = 51		n = 166	
Fall 1990	21.67	5.90	18.26	4.67	19.01	5.80	22.11	5.76	20.88	6.91	19.62	5.36
Spring 1992	21.65	7.23	21.70	6.03	23.69	6.13	24.82	6.48	24.57	6.50	23.07	6.88
Adjusted Mean	21.11		22.47		24.17		24.11		24.33		23.32	

Note: These are summed scores per subscale based on the Scales for Rating Behavioral Characteristics of Superior Students with 8 (Learning), 10 (Creativity), and 9 (Motivation) items and a 4-point response format.

[a] Values are based on procedures comparing first round scores after adjusting for initial differences in social status.

Table 20

Student Activities Survey: Number of Types of Projects Completed During a Two-Week Period in the Spring of 1992

Program Type	Mean	s.d.	n
Spring 1991			
Special School	20.50	4.94	18
Separate Class	20.44	4.24	52
Pull-Out	19.63	4.66	59
Within-Class	18.31	5.01	67
Gifted Comparison Group	19.17	4.68	30
Nongifted Comparison Group	18.05	4.33	96
Spring 1992			
Special School	19.64	5.83	14
Separate Class	20.65	5.09	40
Pull-Out	19.08	4.96	48
Within-Class	18.94	5.25	54
Gifted Comparison Group	19.85	4.80	41
Nongifted Comparison Group	18.74	4.81	54

A sample of 964 students in grades 2 and 3 included 658 students participating in programs for the gifted and talented and 306 regular education students. A series of two-factor (sex x education status) analyses of covariance (ANCOVA) compared gifted and regular education students on the parent CBCL and the Teacher Report Form (TRF) after covarying for the effects of grade level (second or third grade) and racial/ethnic status (Caucasian or non-Caucasian). There were no significant group differences between gifted and regular education students on any of the measures. A sample of 46 of 606 (7.6%) gifted education students and 17 of 245 (6.9%) regular education students were identified as having a high incidence of behavior problems according to the TRF. The association between education status and problem level was not significant. A somewhat larger sample of students was identified as having behavior problems according to parent reports on the CBCL: 89 of 419 (21.2%) gifted education students; and 33 of 202 (16.3%) regular education students. Again, the relation between education status and problem level was not significant. Regarding types of behavior problems, the small proportion of gifted education students having a high incidence of behavior problems did not differ from a sample of regular education students. The low agreement between TRF and CBCL indicates a need for future investigations of parent and teacher perceptions of student adjustment.

Research Question #3: Are there differential effects in achievement for underserved students after the summer break (spring 1991 and fall 1991)?

These results represent a mixed factorial design employing a three-factor ANCOVA (program type x racial/ethnic status x test administration) with repeated measures on the last dimension. This design tested changes in achievement levels from the spring of 1991 to the fall of 1991. The covariate was social status as calculated by the Hollingshead Four-

Factor Index (1975). Independent variables included six levels of program type (the four program types for high ability students and the two comparison groups) and two levels of racial/ethnic status (Caucasian and African-American). These analyses were used to investigate differences in achievement for students following the summer break. Of particular concern were the students from underserved populations. Trends in achievement across all four testing periods were examined by Delcourt, Loyd, Moon, Perie, and Bland (1993). Of particular interest were the upward trends in achievement for African-American and Hispanic students over the two-year period.

The repeated measures ANCOVA for Mathematics Concepts yielded significant main effects for program type ($F = 12.10$, $df = 5, 437$, $p < .001$) and racial/ethnic status ($F = 19.96$, $df = 1, 437$, $p < .001$), with a significant interaction for program type x time ($F = 3.12$, $df = 5, 438$, $p < .01$). The analysis of covariance for Mathematics Problem Solving resulted in three significant main effects: program type ($F = 10.06$, $df = 5, 431$, $p < .001$); racial/ethnic status ($F = 26.88$, $df = 1, 431$, $p < .001$); and time ($F = 26.72$, $df = 1, 432$, $p < .001$). There was also a significant interaction for program type x time ($F = 2.24$, $df = 5, 432$, $p < .05$). Results for Reading Comprehension revealed significant main effects for program type ($F = 8.38$, $df = 5, 436$, $p < .001$), racial/ethnic status ($F = 33.56$, $df = 1, 436$, $p < .001$), and time ($F = 29.82$, $df = 1, 437$, $p < .001$). In Science, the factorial design yielded three significant main effects and two first-order interactions: program type ($F = 11.56$, $df = 5, 410$, $p < .001$), racial/ethnic status ($F = 30.79$, $df = 1, 410$, $p < .001$), time ($F = 5.48$, $df = 1, 411$, $p < .05$), program type x time ($F = 2.32$, $df = 5, 411$, $p < .05$), and racial/ethnic status x time ($F = 5.50$, $df = 1, 411$, $p < .05$). Main effects for Social Studies included program type ($F = 12.99$, $df = 5, 424$, $p < .001$), racial/ethnic status ($F = 20.37$, $df = 1, 424$, $p < .001$), and time ($F = 4.71$, $df = 1, 425$, $p < .05$), while an interaction for racial/ethnic status x time was also found ($F = 12.26$, $df = 1, 425$, $p < .001$).

Mathematics Concepts. Compared to the national sample of second and third grade students for Mathematics Concepts during the spring 1991 testing period (50th percentile = G.E. of 35, 90th percentile = G.E. of 41), achievement for African-American students (Mean = 37.58) is above the national average. However, follow-up mean comparisons for Mathematics Concepts revealed that Caucasian second and third grade students (Mean = 43.47, s.d. = 10.47, $n = 338$) had significantly higher mean scores than their African-American peers (Mean = 37.58, s.d. = 9.20, $n = 112$). Means for each program type are reported in Table 21. The interaction between program type and time is depicted in Figure 1 and a follow-up comparison of mean values for spring 1991 and fall 1991 is located in Appendix H. At the end of 1990-1991 academic year, high ability students in programs for the gifted had higher achievement in Mathematics Concepts than nongifted students. Additionally, students in Special Schools had higher scores than students from the Gifted Comparison Group and from the Within-Class, Separate Class, and Pull-Out programs. Children from Pull-Out programs also had higher Mathematics Concepts scores than those from the Gifted Comparison Group and students from Within-Class programs. For the fall of 1991, students from Special School, Pull-Out, and Separate Class programs showed higher achievement scores than their peers from both comparison groups and the Within-Class program. As the figure of this interaction indicates, high ability children from Pull-Out and Separate Class programs show increases in achievement after the summer. Across all groups, Caucasian students performed better than African-American students.

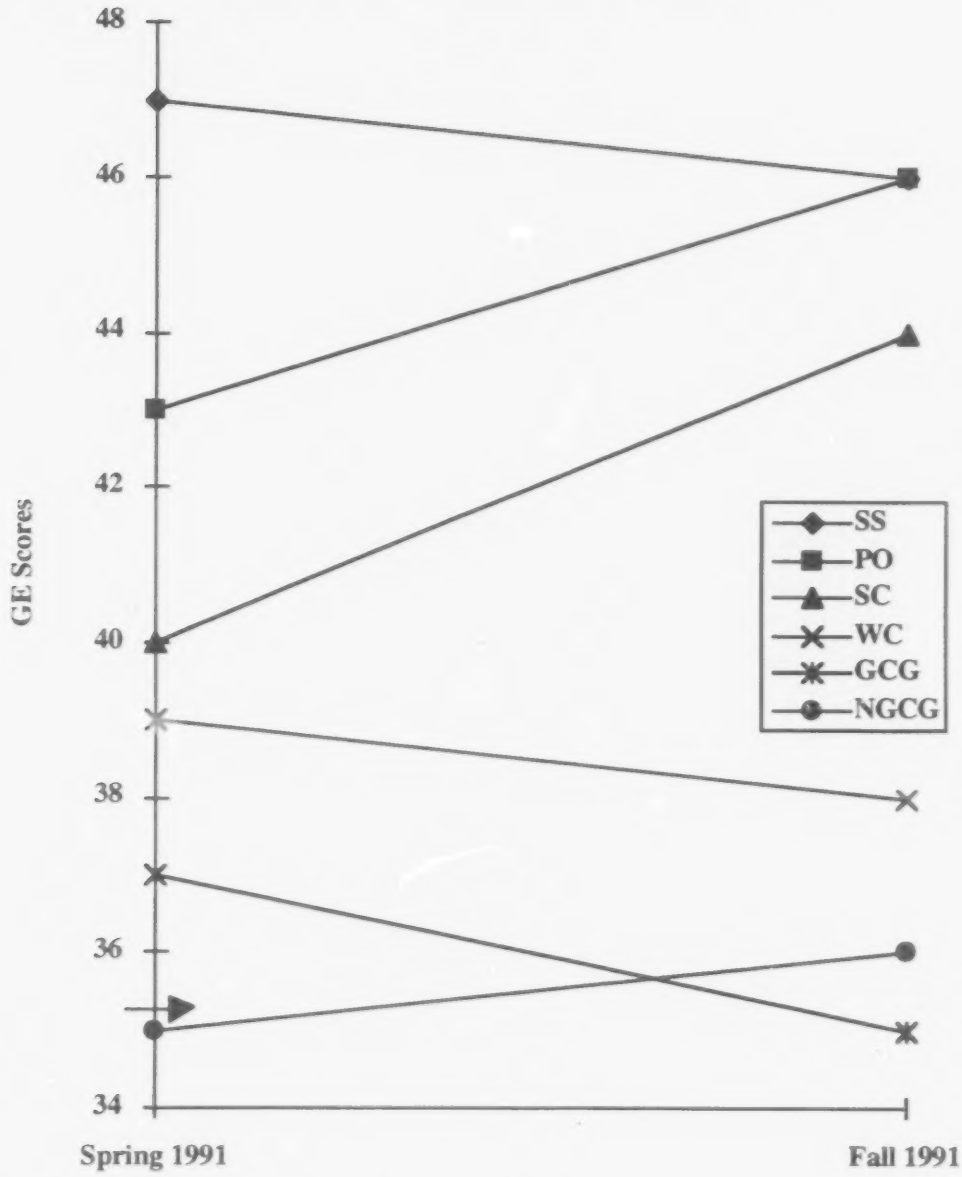
Table 21

Grade Equivalent Scores for the Iowa Tests of Basic Skills in Mathematics Concepts Before and After the Summer Break of 1991[a]

Program Type	Mean	Adjusted Mean	s.d.	n
Spring 1991				
Special School	45.27	47.20	10.30	45
Separate Class	42.25	40.49	11.73	64
Pull-Out	45.27	43.06	8.34	80
Within-Class	40.04	39.49	9.11	98
Gifted Comparison Group	38.56	37.07	11.30	43
Nongifted Comparison Group	35.92	34.66	8.58	120
Fall 1991				
Special School	43.67	46.07	9.00	45
Separate Class	46.27	44.14	13.48	64
Pull-Out	47.09	45.61	9.56	80
Within-Class	39.37	37.63	9.25	98
Gifted Comparison Group	37.67	35.33	7.18	43
Nongifted Comparison Group	37.16	35.52	10.19	120

Note: A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on procedures comparing second and third round scores after adjusting for initial differences in social status.



Note: The arrow indicates the 50th percentile for the norm group. A grade equivalent score of 29 refers to the second year, ninth month (May) of school. Values are based on procedures comparing second and third round scores after adjusting for initial differences in social status.

Figure 1. Interaction of Program Type and Time for Mathematics Concepts Grade Equivalent (G.E.) Scores for Spring 1991 and Fall 1991.

Mathematics Problem Solving. Follow-up mean comparisons for Mathematics Problem Solving with respect to racial/ethnic status revealed that Caucasian students (Mean = 42.98, s.d. = 10.48, n = 333) had higher mean scores than African-Americans (Mean = 35.81, s.d. = 11.16, n = 111). Compared to the national average for the spring testing period (50th percentile = G.E. of 35, 90th percentile = G. E. of 41), African-American students performed slightly above the mean. Mean values for the interaction between program type and time are located in Table 22, while the interaction is depicted in Figure 2. A comparison of mean values for spring (round 2) and fall scores (round 3) is located in Appendix H. In the spring of 1991, students from Special School, Pull-Out, and Separate Class programs had higher scores than their peers from both comparison groups and from the Within-Class program. For this same data collection period, students from Within-Class programs had higher scores than students from both comparison groups. When students were assessed in the fall of 1991, those from Pull-Out, Separate Class, and Special School settings had higher scores than students from both comparison groups and from the Within-Class program. There were no decreases in scores across program type. However, students in programs for the gifted performed significantly better than students in both comparison groups and the Within-Class programs. Regardless of program type, Caucasian students had higher scores in Mathematics Problem Solving than the African-American students.

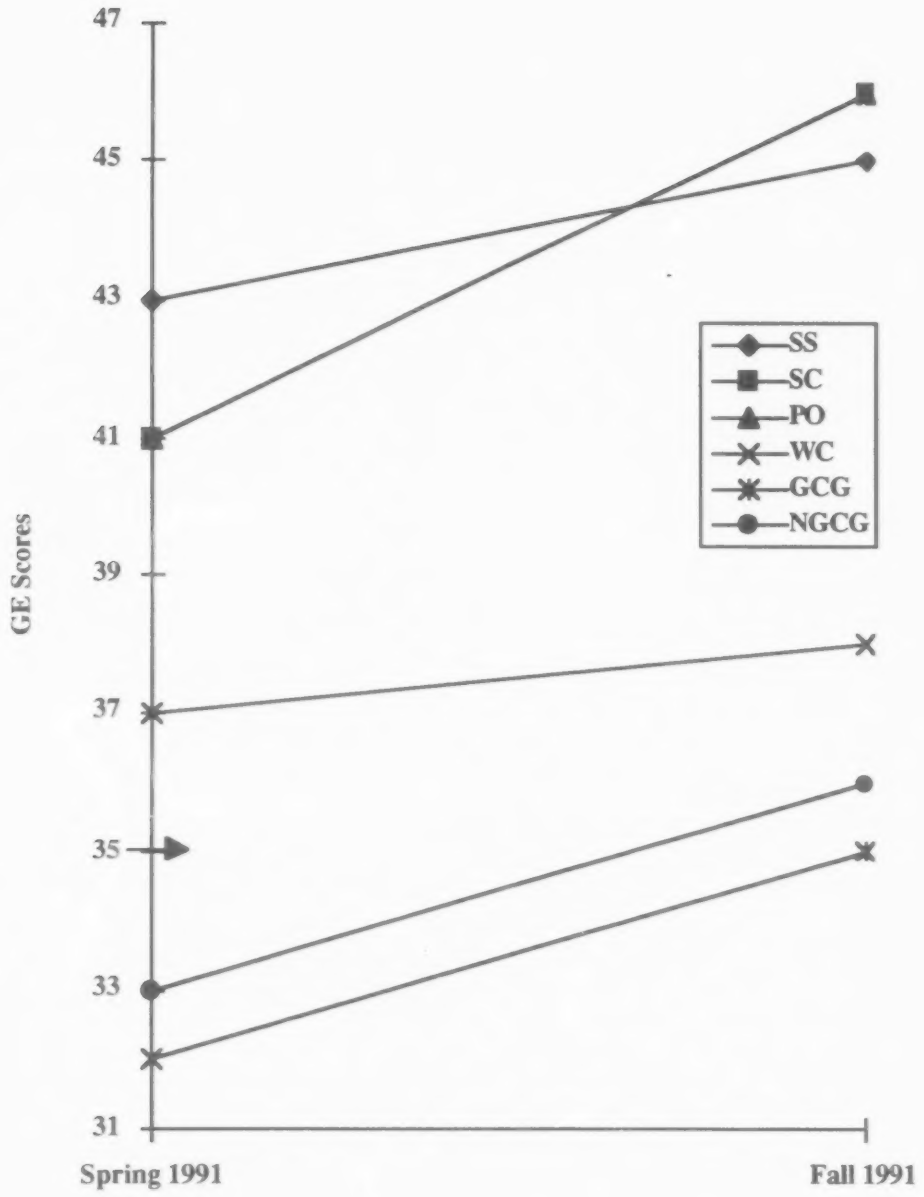
Table 22

Grade Equivalent Scores for the Iowa Tests of Basic Skills in Mathematics Problem Solving Before and After the Summer Break of 1991[a]

Program Type	Mean	Adjusted Mean	s.d.	n
Spring 1991				
Special School	42.71	43.42	9.47	45
Separate Class	42.83	40.65	11.37	63
Pull-Out	43.01	40.68	9.99	75
Within-Class	38.66	37.23	8.90	99
Gifted Comparison Group	35.95	32.12	11.92	43
Nongifted Comparison Group	34.27	32.56	9.85	119
Fall 1991				
Special School	42.29	44.67	10.65	45
Separate Class	47.71	45.63	14.40	63
Pull-Out	48.17	45.88	10.98	75
Within-Class	41.01	38.17	9.39	99
Gifted Comparison Group	37.12	35.36	11.76	43
Nongifted Comparison Group	38.91	36.39	10.97	119

Note: A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on procedures comparing second and third round scores after adjusting for initial differences in social status.



Note: The arrow indicates the 50th percentile for the norm group. A grade equivalent score of 29 refers to the second year, ninth month (May) of school. Values are based on procedures comparing second and third round scores after adjusting for initial differences in social status.
Scores from the Fall and Spring 1991 for Separate Class and Pull-Out programs were similar (see Table 22). The symbols overlap in this figure.

Figure 2. Interaction of Program Type and Time for Mathematics Problem Solving Grade Equivalent (G.E.) Scores for Spring 1991 and Fall 1991.

Reading Comprehension. For Reading Comprehension, follow-up analyses of racial/ethnic status showed that Caucasians (Mean = 46.90, s.d. = 12.86, n = 336) had significantly higher achievement scores than African-Americans (Mean = 36.09, s.d. = 12.06, n = 113) (national norm group 50th percentile = G.E. of 34, 90th percentile = G.E. of 42). Students in the Fall of 1991 (Mean = 43.55, s.d. = 14.59, n = 449), performed better than they did in the spring of 1991 (Mean = 39.44, s.d. = 12.83, n = 449). There were no interactions across program type from the spring of 1991 to the fall of 1991. Means and adjusted means for this variable are reported in Table 23. Pair-wise comparisons of these means were achieved using Student-Newman-Keuls procedures. The outcomes are located in Appendix H. Students from Special School, Separate Class, and Pull-Out programs again have significantly higher achievement scores than students from the two comparison groups and the Within-Class program.

Table 23

Grade Equivalent Scores for the Iowa Tests of Basic Skills in Reading Comprehension Based on a Main Effect for Program Type[a]

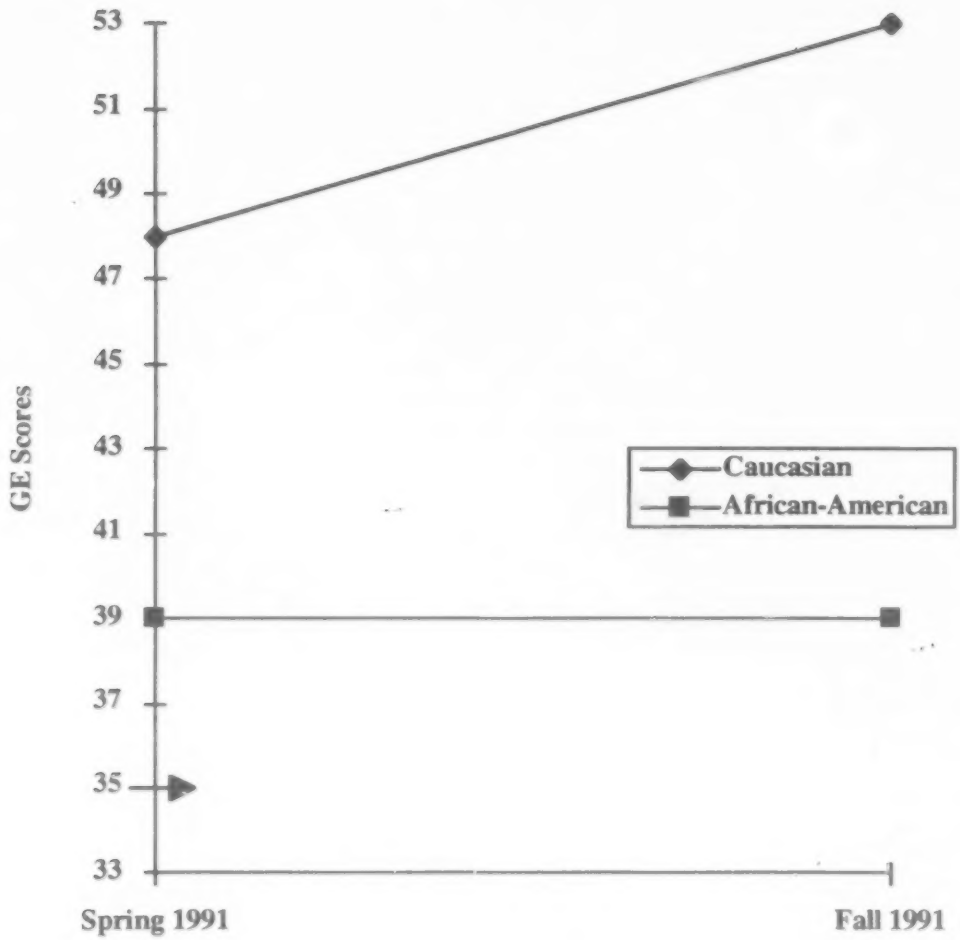
Program Type	Mean	Adjusted Mean	s.d.	n
Spring 1991				
Special School	45.08	45.03	10.24	45
Separate Class	43.66	43.60	14.50	63
Pull-Out	42.23	42.93	11.64	83
Within-Class	37.97	38.01	10.23	99
Gifted Comparison Group	33.08	33.03	15.16	40
Nongifted Comparison Group	33.96	34.03	10.87	119
Fall 1991				
Special School	49.16	49.08	11.17	45
Separate Class	48.35	48.24	17.16	63
Pull-Out	46.74	46.81	14.61	83
Within-Class	41.92	42.00	11.89	99
Gifted Comparison Group	37.66	37.57	9.57	40
Nongifted Comparison Group	37.43	37.56	12.52	119

Note: A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on procedures comparing second and third round scores after adjusting for initial differences in social status.

Science. In comparing Science achievement from round 2 to round 3, the first-order interaction for racial/ethnic status x time indicated that Caucasian students (round 2: Mean = 47.87, s.d. = 16.39; round 3: Mean = 53.18, s.d. = 16.47, n = 312) had significantly higher scores than African-Americans (round 2: Mean = 38.59, s.d. = 18.06; round 3: Mean = 38.65, s.d. = 17.40, n = 111). In addition, Caucasian students performed better in the fall than they had in the spring, while African-American students stayed the same with respect to Science achievement. This interaction is depicted in Figure 3. Scores from these analyses can be compared to the national average for second and third grade students from the spring of 1991 (50th percentile = G.E. of 34; 90th percentile = G.E. of 46). According to these data, African-American students from this sample were above average. Means used to reveal the interaction between program type and time are located in Table 24. The graph of this interaction is displayed in Figure 4. Follow-up procedures can be found in Appendix H. Prior to the summer break, Science scores were significantly lower for nongifted students as compared to students in all other groups. These scores were also lower for students from the comparison groups and from the Within-Class, Pull-Out, and Separate Class programs when compared to the scores from students in Special Schools. After the break, students from both comparison groups and those from the Within-Class program had significantly lower scores than students from Special, Separate Class, Pull-Out, and Within-Class programs.

Social Studies. Table 25 contains mean values used to calculate the pair-wise comparisons for the main effect of program type in Social Studies. Results of these comparisons are in Appendix C. The pattern of significantly lower achievement levels for students in the comparison groups is again documented with students from Special School, Separate Class, Pull-Out, and Within-Class programs having higher means scores than students from both comparison groups. In addition, scores from Special School and Separate Class programs are higher than those from students attending Within-Class programs. In the interaction of racial/ethnic status x time, scores for Caucasian students (round 2: Mean = 49.71, s.d. = 17.96; round 3: Mean = 50.99, s.d. = 16.46, n = 324) were higher than those for African-Americans (round 2: Mean = 43.97, s.d. = 16.72; round 3: Mean = 37.14, s.d. = 17.58, n = 113). The performance for Caucasian students was higher in the fall than it was in the spring, while the scores for African-Americans decreased after the summer. This is depicted in Figure 5.



Note: The arrow indicates the 50th percentile for the norm group. A grade equivalent score of 29 refers to the second year, ninth month (May) of school. Values are based on procedures comparing second and third round scores after adjusting for initial differences in social status.

Figure 3. Interaction of Racial/Ethnic Status and Time for Science Grade Equivalent (E.G.) Scores for Spring 1991 and Fall 1991.

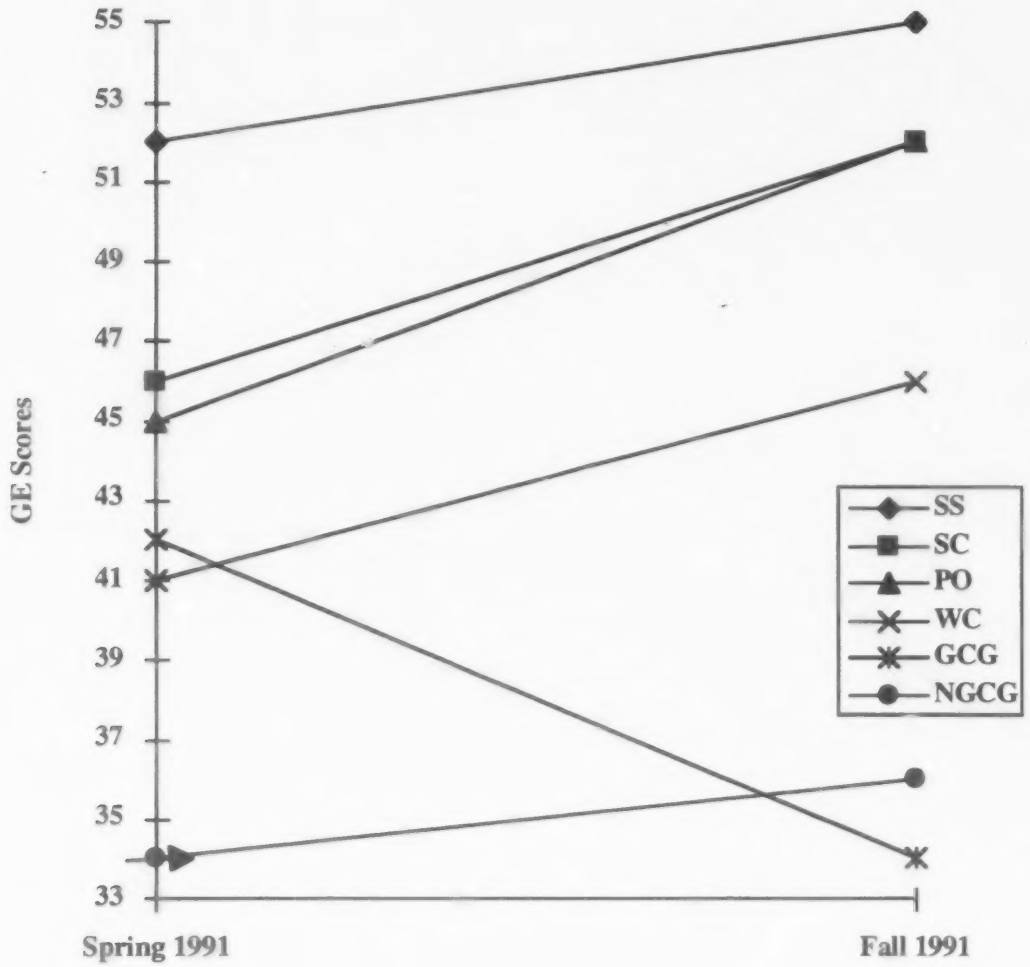
Table 24

Grade Equivalent Scores for the Iowa Tests of Basic Skills in Science Before and After the Summer Break of 1991[a]

Program Type	Mean	Adjusted Mean	s.d.	n
Spring 1991				
Special School	50.36	52.47	13.22	44
Separate Class	49.27	45.69	19.75	62
Pull-Out	50.06	44.50	15.55	65
Within-Class	42.69	40.86	15.63	96
Gifted Comparison Group	43.26	41.99	21.35	43
Nongifted Comparison Group	35.81	33.87	17.87	113
Fall 1991				
Special School	51.64	55.01	12.24	44
Separate Class	55.77	52.47	21.06	62
Pull-Out	57.54	51.67	15.20	65
Within-Class	49.25	46.27	14.46	96
Gifted Comparison Group	42.65	33.94	23.01	43
Nongifted Comparison Group	39.20	36.12	15.64	113

Note: A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on procedures comparing second and third round scores after adjusting for initial differences in social status.



Note: The arrow indicates the 50th percentile for the norm group. A grade equivalent score of 29 refers to the second year, ninth month (May) of school. Values are based on procedures comparing second and third round scores after adjusting for initial differences in social status.

Figure 4. Interaction of Program Type and Time for Science Grade Equivalent (G.E.) Scores for Spring 1991 and Fall 1991.

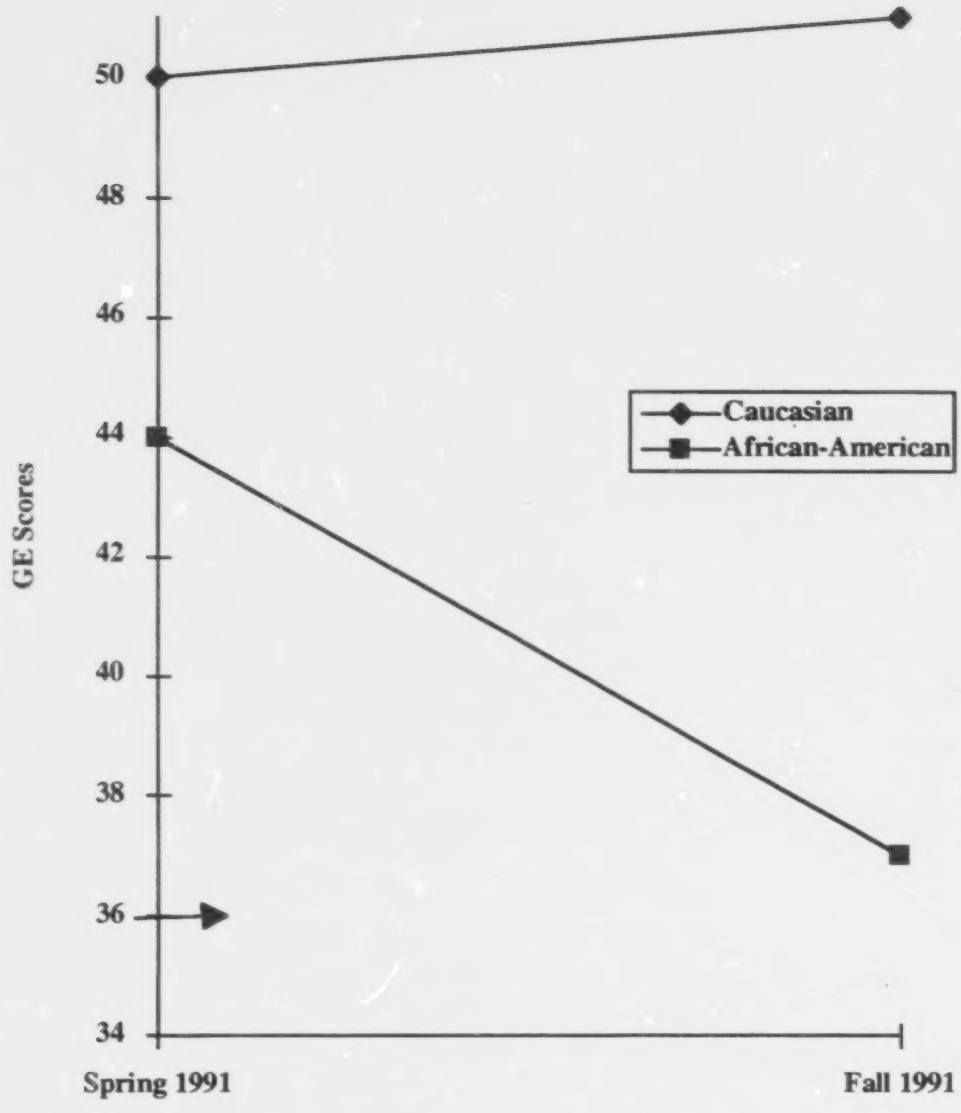
Table 25

Grade Equivalent Scores for the Iowa Tests of Basic Skills in Social Studies Before and After the Summer Break of 1991[a]

Program Type	Mean	Adjusted Mean	s.d.	n
Spring 1991				
Special School	59.60	59.70	17.39	45
Separate Class	52.81	52.93	17.78	63
Pull-Out	51.47	51.43	16.14	71
Within-Class	46.52	46.42	17.17	99
Gifted Comparison Group	30.85	30.90	15.98	44
Nongifted Comparison Group	39.81	39.65	19.57	115
Fall 1991				
Special School	53.40	53.20	12.13	45
Separate Class	49.10	48.87	20.67	63
Pull-Out	48.26	48.32	17.51	71
Within-Class	41.53	41.71	16.55	99
Gifted Comparison Group	38.72	38.62	20.02	44
Nongifted Comparison Group	33.39	33.68	15.24	115

Note: A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on procedures comparing second and third round scores after adjusting for initial differences in social status.



Note: The arrow indicates the 50th percentile for the norm group. A grade equivalent score of 29 refers to the second year, ninth month (May) of school. Values are based on procedures comparing second and third round scores after adjusting for initial differences in social status.

Figure 5. Interaction for Racial/Ethnic Status and Time for Social Studies Grade Equivalent (G.E.) Scores for Spring 1991 and Fall 1991.

Follow-up Analyses: Comparisons of Achievement for Programs Within Program Types

This series of analyses of covariance compared individual programs (i.e., a program type from a specific school district) within gifted program types for the measures of Mathematics Concepts and Reading Comprehension. Comparisons of first round scores were analyzed after controlling for differences in social status.

Mathematics Concepts. There was a main effect for program for the following program types: Special School ($F = 3.67$, $df = 2, 51$, $p < .05$), Separate Classroom ($F = 58.28$, $df = 2, 61$, $p < .001$), Pull-Out ($F = 10.41$, $df = 3, 99$, $p < .001$), and Within-Class ($F = 12.54$, $df = 3, 98$, $p < .001$). Follow-up analyses for the four Separate Classroom programs could not be completed due to a small sample size for one of the programs. Means are reported in Table 26 and detailed results of pair-wise comparisons are in Appendix I. For the Special School programs, scores for school C were higher than those for schools A and B. Pull-Out program J had initial higher achievement in Mathematics Concepts than programs H and K. Representing the Within-Class programs, N had higher scores than M, L, and O, while O had higher scores than program M.

Reading Comprehension. There was a main effect for program for the following program types: Special School ($F = 3.83$, $df = 2, 51$, $p < .05$), Separate Class ($F = 17.67$, $df = 2, 62$, $p < .001$) (based on means for programs D, E, and G) , Pull-Out ($F = 30.08$, $df = 2, 89$, $p < .001$) (based on means for programs H, J, and K), and Within-Class ($F = 10.41$, $df = 3, 97$, $p < .001$). Means are reported in Table 27 and results of pair-wise comparisons are in Appendix C. Program C had higher scores than programs A and B for Special Schools. For the Within-Class programs, N had higher scores than L, M, and O and O had higher scores than program M. Follow-up analyses for the four Separate Classroom programs and the four Pull-Out programs could not be completed due to a small sample size for one of the programs in each program type.

These analyses had only exploratory value. Significant differences suggest that individual programs have specific effects on learning outcomes. This might lead to future investigation of additional program characteristics such as teacher training or program pedagogy.

Table 26

Grade Equivalent Scores for the Iowa Tests of Basic Skills in Mathematics Concepts Comparing Programs Within Program Types[a]

Program Type	Mean	Adjusted Mean	s.d.	n
Special School				
A	33.12	33.35	7.13	25
B	31.07	31.08	7.29	15
C	39.50	39.26	10.08	12
Separate Class				
D	29.63	-	-	24
E	18.71	-	-	7
G	43.29	-	-	31
Pull-Out				
H	31.89	31.60	6.33	35
I3	4.33	35.07	5.50	9
J	39.81	40.17	7.61	43
K	35.31	34.50	5.54	13
Within-Class				
L	29.21	29.15	6.72	34
M	26.36	26.49	4.91	14
N	38.58	38.73	6.86	31
O	32.35	32.12	9.57	20

Note: The symbol "-" indicates that the data were not available for analysis. A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on procedures comparing first round scores after controlling for differences in social status.

Table 27

Grade Equivalent Scores for the Iowa Tests of Basic Skills in Reading Comprehension Comparing Programs Within Program Types[a]

Program Type	Mean	Adjusted Mean	s.d.	n
Special School				
A	34.64	35.21	6.06	25
B	32.20	32.23	9.51	15
C	44.08	43.48	18.40	12
Separate Class				
D	33.84	-	-	25
E	36.43	-	-	7
G	48.71	-	-	31
Pull-Out				
H	29.82	-	-	34
I	-	-	-	-
J	47.67	-	-	43
K	42.85	-	-	13
Within-Class				
L	35.50	35.41	9.64	34
M	23.71	23.91	9.10	14
N	41.32	41.54	10.94	31
O	33.63	33.30	8.76	19

Note: The symbol "-" indicates that the data were not available for analysis. A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on procedures comparing first round scores after controlling for differences in social status.

CHAPTER 5: Conclusions and Implications

The purpose of this project was to compare the learning outcome effects of four standard program strategies for teaching gifted and talented students: (a) Within-Class programs; (b) Pull-Out programs; (c) Separate Class programs; and (d) Special School programs. Specific emphasis was given to learning outcome effects on traditionally underserved students.

Learning outcomes were broadly defined to include both academic and affective effects of participating in a program for the gifted and talented. In this study, academic effects included performance on standard achievement tests, teacher ratings of student learning behaviors, and student attitudes toward learning processes. Affective outcomes were student self-perception, intrinsic/extrinsic motivation, and behavioral adjustment.

The proposed multi-site, longitudinal study investigated learning outcomes at four stages. A sample of second and third grade students were assessed at the time of entrance (fall 1990) into one of the four types of programs, at the end of their first school year in the program and at the beginning and end of the following year. Students were compared to two control groups, one of comparable students who attended schools that did not provide services for gifted and talented students at the targeted grade levels, and another of nongifted peers. Program effects on Caucasian and African-American students were analyzed.

Results of this project addressed 3 major research questions: (a) Are there significant differences between program types (strategies)? (c) Do any of the program types have differential effects on underserved students? (c) Are there differential effects in achievement for underserved students after the summer break (spring 1991 and fall 1991)?

Methods

The study employed a quasi-experimental design with pre-post assessment of multiple groups. Group membership was defined by four types of gifted programs, and two control groups. There were three to four examples of each program type in order to enhance the robustness of study findings. Additionally, main effects for ethnic status were examined. Baseline data on academic and affective measures were obtained at the beginning of a child's participation in the program for the gifted and talented. These data were collected independently of any other information used in the school district's identification procedure and were not used in the school's student selection process. Follow-up data were collected at the end of one academic year and at the beginning and end of the following year.

During the course of the project, a variety of research questions were posed to examine the selected instruments as they related to the sample of high ability students and to understand trends and changes in the data over time. Among these studies were investigations of instrumentation, including reliability (Delcourt, Loyd, Moon, Perie, & Bland, 1993) and validity (Goldberg, 1994). First year analyses examined student entry characteristics (Cornell, Delcourt, Goldberg, & Bland, 1992) and changes in learning outcomes after one year in a gifted program (Delcourt, Loyd, Bland, & Dodd, 1991). A particular focus was also placed on the comparison between gifted and nongifted students on specific characteristics. In their examination of achievement, Delcourt, Loyd, Moon, Perie, and Bland (1993) analyzed trends across program types, sex, and racial/ethnic status

for a two-year period. The relation between achievement and self-concept was examined (Cornell, Delcourt, Goldberg, & Bland, in press) as was the incidence of behavior problems for gifted and regular education students (Cornell, Delcourt, Bland, Goldberg, & Oram ,1994). These studies are reported in full in other sources.

The applicability of the instruments for the sample of gifted learners was investigated through an examination of the internal consistency reliability and stability coefficients for achievement, self-perception, intrinsic/extrinsic motivation, and teacher ratings. Additionally the factor structures of the self-perception and motivation scales were analyzed. Information pertaining to reliability and validity of selected instruments is located in Appendix C.

The main framework for statistical analyses was a series of analyses of covariance (ANCOVAs) procedures which control for baseline adjustment, as recommended by Cook & Campbell (1979). For the first research question, main effects across the gifted program types (Special School, Separate Class, Pull-Out Program, Within-Class Program) and racial/ethnic status (Caucasian and African-American) were examined using learning outcome measures at the end of year 2, after controlling for baseline assessment and social status. Subsequent ANCOVAs were employed to investigate the second research question looking across all six levels of program type (four gifted program types and two comparison groups). Analysis of covariance procedures were also used to examine mean differences for the variables of attitudes toward learning, teacher ratings, and behavioral adjustment. For attitudes toward learning and teacher ratings, only the main effect for program type was investigated after controlling for initial differences on each variable. Main effects for sex and educational status (gifted and nongifted) were examined from the fall of 1990 regarding the behavioral adjustment of students after covarying for the effects of grade level (grade 2 and grade 3) and racial/ethnic status (Caucasian and non-Caucasian). Question #3 focused on spring 1991 and fall 1991 scores using a mixed factorial design employing a three-factor ANCOVA (program type x racial/ethnic status x test administration) with repeated measures on the last dimension. Follow-up investigations for all analyses compared mean differences using Student-Newman-Keuls procedures. Details on all follow-up procedures are located in Appendices F, G, H, and I.

Each school program is naturally and unavoidably nested within a program type and four rounds of data collection provide many opportunities for comparing data sets over time. First, a comparison was made among students in the four types of gifted programs. Second, each of the four gifted programs was compared to the two comparison groups. Third, achievement over the summer break was analyzed. Finally, a follow-up series of analyses compared individual programs within program types. This latter group of analyses had only exploratory value.

Results and Discussion

Research Question #1: Are there significant differences between program types (strategies)?

Eleven ANCOVA procedures were completed, one for each outcome variable (5 achievement subtests, 2 self-perception inventories, and 4 motivation scales). After controlling for social status and initial differences in first round scores, significant differences were found in academic achievement and affect across the four types of programs for gifted students. In addition, not one of the program types showed significant increases for all academic and affective outcomes. Follow-up analyses were conducted

using Student-Newman-Keuls procedures for comparisons of means. Results indicated that students in Special Schools, Separate Class programs, and Pull-Out programs showed higher levels of achievement than students from Within-Class programs. African-American students had significantly lower levels of achievement than Caucasian students. There were no significant differences across program type or ethnic status for Social Acceptance, the degree to which children felt comfortable with their friends. Students from Pull-Out and Within-Class programs felt more capable in their academics, preferred more challenges in the classroom, and were more likely to want to work independently than their peers in Separate Class programs. A discussion follows in the section "Cognitive and Affective Learning Outcomes."

Research Question #2: Do any of the program types have differential effects on underserved students?

The main analyses included eleven ANCOVAs (5 achievement subtests, 2 self-perception inventories, and 4 motivation scales). Procedures examined the main effects of program type and racial/ethnic status and statistically controlled for initial differences in performance as well as social status. There were no first-order interactions for program type and racial/ethnic status for any of the examined variables. In other words, program type did not have any differential effects on underserved students (African-Americans). There were, however, main effects for racial/ethnic status with respect to all areas of achievement. Follow-up analyses were conducted using Student-Newman-Keuls procedures for comparisons of means. ANCOVAs were performed for three other variables, attitudes toward learning, teacher ratings, and behavioral adjustment. These results as well as a discussion of all findings can be found in the following section.

Cognitive and Affective Learning Outcomes

Achievement. In a study of student entry characteristics (Cornell et al., 1992), results indicated that overall, students in Special School and Separate Classroom programs scored significantly higher than gifted students in other program options. These initial analyses were calculated using multivariate analyses of covariance after controlling for grade level and racial/ethnic status. According to the results of the present report, after adjusting for differences in first round scores and social status, students in Pull-Out, Separate Class, and Special School programs showed higher achievement than gifted students who were not in programs and, in most cases, those from Within-Class programs and nongifted students. Why might this be the case? Why do students in three of the program types have higher scores than other students? Part of the answer may be found in the degree of agreement between the content of the program and the assessment instrument. Across all sites, programs were selected for the study because a major curricular focus was placed on academic progress rather than on another area such as artistic or creative development. With Special School and Separate Class programs traditionally emphasizing academics, it is important to note that the Pull-Out programs in this study also had a strong academic orientation. For example, within all four of the Pull-Out programs, the curriculum consisted of academic units not found in the regular school program, with many topics relating to science (e.g., tropical rain forests, land formations, weather patterns). Students in these programs were also encouraged to pursue their own investigations. Although a limited amount of time was spent in the resource room (approximately 2 hours/week), the emphasis on academics within the Pull-Out model appears to have contributed to the achievement level of these students, with outcomes similar to those for Special Schools and Separate Class programs. This was not the case for the Within-Class programs. Apparently students from the Within-Class programs do not attain levels of achievement as high as the students in the other program types, perhaps because of a lesser focus on academic skills.

In the areas of Reading Comprehension, Science, and Social Studies, students from the Special School, Separate Class, and Pull-Out programs had the highest achievement scores, often significantly higher than their peers from the Within-Class program and both of the comparison groups. The mathematics subtests provided different results. The nongifted children performed significantly better in Mathematics Concepts and Mathematics Problem Solving than the children from the Gifted Comparison Group and the gifted children participating in the Within-Class programs. This may mean that these gifted students were not originally selected for their ability in mathematics. This might have occurred if these second and third grade students were originally identified based on early reading and language abilities and not on their visual-spatial and number abilities. In the case of students from the Within-Class program, if the gifted students were selected for their general intellectual ability including a component that reflects mathematics, the results of this study could imply that gifted students participating in these programs were missing information in mathematics that they needed in order to perform well on a standardized achievement test.

Program type was a significant variable in the assessment of academic achievement, as was racial/ethnic status. Across all subscales, Caucasian students showed higher achievement than African-American students. As discouraging as this result may seem, African-American students were at or above the mean for their respective grade levels and these scores showed an upward trend from the fall of 1990 to the spring of 1992 (Delcourt et al., 1993).

In order to examine the relation between social status and racial/ethnic status on achievement, an additional set of follow-up analyses were conducted. A mixed factorial design was used employing a three-factor ANOVA (social status x racial/ethnic status x test administration) with repeated measures on the last dimension. Results indicated that there were no significant main effects for social status between the three categories of low, medium, and high across all levels of achievement ($p < .05$). The main effects for racial/ethnic status have already been reported (see results beginning on p. 31 of this document). There were no significant interactions between racial/ethnic status and social status across all five achievement subscales ($p < .05$). Mean values for student responses are located in Appendix J, Table 5.1. These results mean that after participating in a gifted program for two years, the students showed scores in achievement which did not differ significantly across the three categories of social status regardless of their being African-American or Caucasian.

Self-perception. Scholastic Competence pertains to a child's perception of his or her ability to do well academically. Social psychologists have indicated that individuals base their perceptions of self on comparisons they make between themselves and others. One outcome of making social comparisons is that children who compare themselves to peers of similar academic ability feel an increase in competition, thereby lowering their self-perceptions of scholastic competence (Coleman & Fults, 1982; Hoge & Renzulli, 1991). If this is true, one would hypothesize that students from the Gifted Comparison Group, Pull-Out program, and Within-Class program should have had higher perceptions of their scholastic abilities than children from the Separate Classes and the Special Schools, since the former were in heterogeneously grouped classes according to ability while the latter were in homogenous groups. This was in fact the case. These results are supported by researchers who point out the importance of documenting the social reference groups employed by those identified as gifted, since the scores of these students vary when they compare themselves to either their gifted or nongifted peers (Coleman & Fults, 1982, 1983; Harter & Zimpf, 1986; Rogers, Smith, & Coleman, 1978). Therefore, student perceptions about their abilities appear to vary depending on the type of program in which they are placed.

The absence of any differences across groups for perceived Social Acceptance suggests two possible explanations. First, children in elementary school may not be ready to respond to questions about their social relations. Their perception of themselves in relation to others may be too egocentric to allow for distinct reactions to statements about popularity and satisfaction with one's peer group. A second explanation is that children in all groups seemed comfortable with the degree to which they were accepted by their peers. This means that children find friends and are likely to feel comfortable in any grouping arrangement, thus decreasing the concern that acceptance by peers should be a primary criterion when selecting a type of program for high ability elementary school students. Nevertheless, school personnel are certainly not exempt from focusing on the adjustment needs of their students. Many programs in the study incorporated goals for developing intra and inter-personal understanding, a factor that may have influenced the finding of no significant differences across groups.

Results also revealed that Caucasian and African-American students have similar perspectives of competence about their scholastic capabilities and their social relations, as assessed by the Scholastic Competence and Social Acceptance scales, respectively (Harter, 1985). These results are not shared by Fordham and Ogbu (1986) who found that African-American students have lower perceptions of their academic abilities than Caucasians. This may mean that Scholastic Competence is a developmental construct which is present to a greater degree in African-American children at the elementary school level and that perceptions of scholastic ability for this population decrease over time. Another explanation is that more positive attitudes toward education were prevalent in the schools selected for the present study.

Intrinsic/extrinsic motivation. This construct was assessed using a scale called Intrinsic Versus Extrinsic Orientation in the Classroom (Harter, 1980). The subscale of internal criteria for success/failure examines the degree to which an individual is reliant on internal or external sources of evaluation, with high scores assigned to the internally motivated individual. After considering initial variations in scores and the social status of the families in the study, no significant differences appeared across groups, nor did differences according to racial/ethnic status.

The subscale of Independent Judgment is the ability to make decisions based not only on the capacity to discriminate between and prioritize tasks, but also on the amount of practice one has in making these judgments. When all six groups were compared, students from Within-Class and Special School programs felt more capable than nongifted students to make judgments about what to do in school. These statistically significant results indicated that students in homogeneous and heterogeneous grouping arrangements had the opportunity and preferred to make their own judgments regarding classroom activities. There were no differences between groups when responses from the four gifted programs were compared.

Independent Mastery refers to the degree to which a child prefers to work on his or her own. High scores reflect a student's preference to learn independently. Students from Separate Class programs were the most reliant on teacher guidance for completing assignments and solving problems. Their scores were significantly lower than those of students from the Pull-out and Within-Class programs, and the Nongifted Comparison Group. Students from Separate Class programs also viewed their learning environments as highly teacher-oriented, were more dependent on external sources of evaluation, preferred fewer challenges, felt less competent scholastically, and less accepted by their peers, as evidenced by their having the lowest mean scores in each of these areas. Separate Class programs may be providing their students with academically rigorous agendas, but these data suggest a need for a greater focus on affective development.

The author of this instrument, Susan Harter (1980), describes the Preference for Challenge scale as a dichotomy between the preference for challenge vs. the preference for easy work assigned. High scores indicate that students prefer more challenging tasks. A problem with the interpretation of this construct is the lack of information about the difficulty of the tasks offered in each program. For instance, an item from this instrument directs students to choose a statement that best describes them: *"Some kids like to go on to new work that's at a more difficult level"* but *"other kids would rather stick to the assignments which are pretty easy to do"*. A low rating for this item does not necessarily imply that students do not want to be challenged, but perhaps that they are already being challenged and would not want more work. This seems a reasonable hypothesis since the programs with the lowest scores were the ones with the highest levels of achievement in a traditionally more academic environment, the Separate Class and Special School programs. Likewise, it is difficult to interpret the reason why African-American students in programs for the gifted had significantly lower scores on this scale than their Caucasian classmates. While members of the former group also had lower scores in achievement than Caucasian students, they *had* been recognized by their teachers for their gifted behaviors through the selection process for the program. It is likely that a reexamination of achievement needs to be considered for African-American students. In an investigation of achievement and self-concept of minority students, Cornell, Delcourt, Goldberg, and Bland (1995) indicated that "Future studies should investigate whether standardized test scores are equally predictive of academic success for both minority- and majority-group students" (p. 202). Moreover, student perceptions of academic success and challenge should be researched among these groups.

Attitudes toward learning. This measure was analyzed after controlling for initial differences on each scale because a lower response rate prevented statistical analyses using the covariate of social status. This instrument assesses the degree to which students perceive their classrooms as being student-centered or teacher-centered. High scores indicate that the classroom is perceived as an environment that provides opportunities to share ideas with classmates, pursue topics of interest, and progress at one's own rate. Results indicated that students in Special Schools had more positive attitudes toward learning than students in all other settings. There was no significant difference, however, between scores from Special School subjects and members of the Gifted Comparison Group. One might hypothesize that, in order to compensate for the absence of a program, teachers were trying to provide their gifted students with more structured opportunities to engage in self-directed learning. Two national United States studies, however, both of regular classroom practices with gifted students, provide conclusions to the contrary (Archambault, Westberg, Brown, Hallmark, Emmons, & Zhang, 1993; Westberg, Archambault, Dobyns, & Salvin, 1993). Another explanation for these results may be that gifted students in regular classrooms are provided with less direction than other students as a result of the "they're so smart, they can figure it out for themselves" attitude toward the gifted. Consequently, these students perceive their classrooms as more student-centered than do many other gifted students attending programs. Unfortunately, this survey does not provide data on the quantity or quality of the child-centered activities, but only on the students' perception of these specific activities as they might occur in the classroom.

Teacher ratings. These measures were analyzed after controlling for initial differences on each scale because lower teacher response rates prevented statistical analyses using the covariate of social status. The most striking pattern among these data was the significantly lower scores for teacher ratings of students in Special Schools as compared to students in all other types of programs. A possible explanation for the higher ratings for students in the other program categories is the point of reference used by teachers. In other words, teachers rating students from the Separate Class program, Pull-Out program, Within Class program, and Comparison Groups may have been comparing the

characteristics of the subjects in the study to the characteristics of the many students in their classes and schools, thus, seeing higher levels of these characteristics and rating them above average more often than did the teachers from Special Schools. Lower ratings by teachers in Special Schools may also be due to the possibility that teachers who elect to teach in or are selected for these school programs have higher expectations for student performance.

Student activity survey. One important goal of many gifted programs is to stimulate independent learning through the pursuit of special projects (Roeder, Haensly, & Edlind, 1982; Treffinger & Renzulli, 1986). A Student Activities Survey was therefore sent to parents to be completed with their child. Items pertained to student involvement in both curricular and extracurricular special projects in areas such as science, mathematics, humanities, art, and other areas. Subjects in all groups participated in a similar number of types of activities during the spring of year 1 and year 2 of the study.

Behavioral adjustment. The following behavior problem scales were addressed in using the parent and teacher versions of the Child Behavior Checklist (CBCL): Anxious, Depressed, Uncommunicative, Obsessive-Compulsive, Somatic Complaints, Social Withdrawal, Hyperactive, Aggressive, and Delinquent. Results were reported only for the first round of data collection for three reasons. First, the instruments were too time-consuming to continue their administration for all four data collection periods. Second, parents and teachers objected to completing the surveys because they thought the items only focused on the negative aspects of student behavior, with 120 items referring to student problems. Third, a follow-up administration of the instruments in the spring of 1992 yielded extremely poor return rates (3% for teachers and 29% for parents). Fall 1990 scores were covaried for the effects of grade level (second or third grade) and racial/ethnic status (Caucasian or non-Caucasian). There were no significant group differences between gifted and regular education students on any of the subscales. Regarding types of behavior problems, the small proportion of gifted education students having a high incidence of these problems did not differ from that found in a sample of regular education students. These results do not necessarily imply that gifted students and nongifted students are identical in their psychological and emotional needs. It appeared, rather, that students from both groups had the same variety of largely standard behavior problems and that the proportions of serious behavior problems were similar for both groups.

Research Question #3: Are there differential effects in achievement for underserved students after the summer break (spring 1991 and fall 1991)?

There were significant differences across program type and racial/ethnic status for all achievement subtests over the summer break. Generally, in all areas of academics, students in programs for the gifted scored higher than the nongifted and gifted students not attending programs. Since one goal of these school districts was to enhance individual learning skills, the finding that these students continued to gain in achievement over the summer is in agreement with the reports of researchers who concluded that students who are motivated and familiar with independent learning techniques tend to perform better than other students when they find themselves in a less structured environment (Heyns, 1987).

What effects did the summer break have on student achievement regarding racial/ethnic status? Once initial differences in social status had been controlled statistically, Caucasians had higher scores than African-Americans on all subtests, but the means for the latter group remained above the 50th percentile as compared to the norm group and showed an upward trend in all areas of achievement except in science and social studies. For

African-Americans, science scores stayed the same over the summer and social studies scores decreased.

In order to examine the relation between social status and racial/ethnic status on achievement after the summer break, a set of additional follow-up analyses were conducted. A mixed factorial design was used employing a three-factor ANOVA (social status x racial/ethnic status x test administration) with repeated measures on the last dimension. Results indicated that there were no significant main effects for social status between the three categories of low, medium, and high across all levels of achievement ($p < .05$). The main effects for racial/ethnic status have already been reported (see results beginning on p. 52 of this document). There were no significant interactions between racial/ethnic status and social status across Mathematics Concepts, Mathematics Problem Solving, Reading Comprehension, and Science achievement subscales ($p < .05$). However, there was a significant interaction between racial/ethnic and social status for Social Studies ($F = 3.13$, $df = 2, 245$, $p < .05$). Mean values for all student responses are located in Appendix K, Table 6.1 and are depicted in Figures 6 and 7. These results indicated that after the summer break, student scores in achievement did not differ significantly across the three categories of social status whether they were those of African-Americans or Caucasians, except for the subscale of Social Studies. Furthermore, a difference occurred only for students from households of medium social status with their being a significant decrease in Social Studies scores after the summer break (see Appendix K, Figure 6).

Implications and Recommendations

This study has fundamental implications for individuals involved with the improvement of educational services for gifted children, and generally for those committed to the development of a child's talents. Unfortunately, many provisions for the gifted are being eliminated in schools across the United States because of a lack of relevant information about the effects of appropriate educational services. Indeed, recent widely circulated conclusions appear to be "based on subjective reviews and informal analyses of the literature" (Kulik & Kulik, 1991, p. 191).

Recommendations from this study should be considered by policy makers and educators as they assess the impact of their programs for gifted students. These recommendations apply to all who share the responsibility for educating gifted learners, in particular administrators, gifted education specialists, curriculum consultants, guidance personnel, classroom teachers, and parents.

The evidence gathered from this empirical study of learning outcomes in gifted education clearly indicates that programs for the gifted are effective. Primary findings in this report revealed that decisions about program implementation should be based on research about learning outcomes for specific program types (Special School, Separate Class, Pull-Out, Within-Class). This is especially important because there are different outcomes in terms of achievement, self-concept, motivation, teachers' ratings of students, and attitudes toward learning for children in different types of programs.

Contrary to the conclusions reached by Oakes (1985) and Slavin (1987), data from this study lead to the conclusion that ability grouping for gifted students is an effective educational practice. In terms of achievement, gifted children attending special programs performed better than their gifted peers not in programs. Specifically, children in Special Schools, Separate Class programs, and Pull-Out programs for the gifted showed

substantially higher levels of achievement than both their gifted peers not in programs and those attending Within-Class programs.

Policy makers should know that students from Within-Class grouping arrangements received the lowest scores in all areas of achievement (mathematics concepts, mathematics problem-solving, reading comprehension, science, and social studies) when compared to their gifted peers who participated in either Special School, Separate Class, or Pull-Out programs. Since Within-Class programs are a popular model in gifted education, their curricular and instructional provisions for the gifted must be carefully maintained lest they disintegrate into a no-program format. Recent research by Archambault et al. (1993) and Westberg et al. (1993) documenting the paucity of systematic provisions for gifted and talented children in the regular classroom are worthy sources on this particular topic. Furthermore, an examination of characteristics of "exemplary" elementary school programs in gifted education (Special School, Separate Class, Pull-Out, and Within-Class) was conducted by Delcourt, and Evans (1994) as a follow-up to the present study of learning outcomes.

Teachers' perceptions of student learning characteristics also appear to be influenced by the type of program used in a school. Despite the fact that student entry characteristics were similar across programs, teachers in Special Schools consistently rated their students lower in creativity, learning, and motivation. If teachers are giving these students slightly lower ratings because they set higher expectations for them, then educators and researchers must be cautious in their interpretations of data from rating scales: scores from different types of programs might not be directly comparable. Teachers and members of student selection committees should observe the relative ratings of students nominated for their programs instead of selecting an *a priori* cutoff score since mean scores vary depending on the type of program.

Academic outcomes did not constitute the only focus in programs for the gifted. All districts included in this study cited goals for enhancing both the cognitive and affective characteristics of their students, but one program type stood out since it showed an imbalance in the outcomes of these measures: students from the Separate Class format scored at the highest levels of achievement with the lowest perception of academic competence, preference for challenging tasks, sense of acceptance by peers, internal orientation, and attitudes toward learning. In programs which stress academics, one should not lose sight of the attention students require for healthy adjustment to the school environment. To address this necessity, teacher preparation for working with gifted children should include instruction for incorporating academics within the development of a realistic and positive self-concept. One Special School for the gifted emphasized the following instructional focus:

> The art of teaching gifted and talented students resides in each teacher challenging the child's enthusiasm for learning while gradually increasing the responsibility students take for their own success (District C).

Students from the Gifted Comparison Group, Pull-Out program, and Within-Class program had higher perceptions of their scholastic capabilities than children from the Separate Class and the Special School programs. The former were in heterogeneously grouped classes according to ability while the latter were in homogeneous groups. This phenomenon occurs after students are initially placed in programs for the gifted and at least up to two years after they have been participating in programs. Parents and teachers should anticipate this phenomenon and be prepared to address this issue by helping students understand that they naturally make comparisons between themselves and their peers, but

that they should also learn how to focus on ways to improve their own performance by comparing their own past endeavors with their present efforts and future goals.

Students from Within-Class and Special School programs felt more capable than nongifted students to make judgments about what to do in school. Students from both types of programs felt that their learning environments gave them the opportunity to make judgments independently. This means that gifted students as a group do not automatically know how to or learn to make judgments on their own and that teachers should consider a focus on this skill when planning their curricula.

Students from Separate Class and Special School programs had the lowest scores regarding preference for challenging tasks. However, an examination of the present instrument showed that these students may also have been indicating that they did not need or want additional work. Determining the degree of challenge presented by a particular program is a complex process and must take into consideration the types of tasks inherent to that program and how they are matched to the abilities and needs of the students.

Student attitudes toward learning were included in the study by using an instrument that assessed the degree to which students viewed their environment as being either student-centered or teacher-centered. Students in Special Schools were more likely to view their classrooms as being student-centered than their peers in all other settings. There was no significant difference, however, between scores from Special School subjects and members of the Gifted Comparison Group. Individuals who believe that their programs are student-centered should assess them in terms of this concept, since students do not necessarily view the programs the same way.

Additionally, adjustment issues were investigated through the administration of an inventory of behavior problems. It appeared that students from both gifted and nongifted groups had the same variety of largely standard problems and that the proportions of serious problems were similar for both groups. However, these results do not imply that gifted and nongifted students possess identical psychological and emotional needs (Colangelo & Zaffrann, 1979; Heller & Feldhusen, 1986; Janos & Robinson, 1985; Schauer, 1976; Whitmore, 1980). The various ways gifted children adapt to the environment are being investigated by Sowa, May, Callahan, & Delcourt in a research project at the University of Virginia (cited in Renzulli, Reid, & Gubbins, 1992).

If one wondered about the effects gifted students had on their nongifted peers, this study determined that subjects in the nongifted comparison group maintained achievement levels at or above the 50th percentile for the two years of the study. Thus the existence of programs for the gifted did not produce any measurably harmful effects on the academic achievement of the nongifted students present in schools with identified gifted students. In addition, there were no differences between any groups in the study regarding their social perspectives. This refers to the finding that students in all groups (gifted and nongifted) felt comfortable with the numbers of friends they had in school and with their own popularity. The type of grouping arrangement did not influence student perceptions of their social relations for gifted or nongifted students.

What are the implications of this study for underserved populations? There were no differential effects for Caucasian and African-American students by program type, which leads to the conclusion that no particular program type affected the learning outcomes of students according to racial/ethnic status. Despite the fact that they showed lower performance in achievement than Caucasians, African-American students participating in programs for the gifted maintained above average academic standings throughout the two years of the study. However, during the summer break of 1991, their scores in social

studies decreased by the equivalent of seven months over the three-month summer period. In addition, their performance in science showed no change, while their Caucasian counterparts increased their achievement by five months over the summer of 1991. The gap in science scores between African-American and Caucasian students after the summer break suggests that children in the former group may be starting their school careers with an even lower understanding of scientific concepts than their Caucasian peers. Perhaps a summer program offering reinforcement of academic skills would lead to an improvement in the Science and Social Studies scores of these African-American students.

Traditionally, African-American students have been underrepresented among the gifted population because of insufficient or faulty identification. The present study, however, demonstrates that once they are admitted into appropriate programs, their achievement levels remain above the national average and continue to follow an upward trend over time. This provides further evidence that these programs are by and large valid, successful learning environments for students from the second largest ethnic population of this country.

In summary, before deciding on any particular option, policy makers should bear in mind that there are significant differences in achievement and affect for students in different types of programs for the gifted. No single program fully addresses all the psychological and emotional needs of students. Yet if success can be gauged by high academic performance and satisfaction with oneself and one's learning environment, then the concept of specific programming for the gifted is clearly valid.

Limitations of the Study

One of the most disconcerting factors in a large-scale longitudinal study is the loss of data during the project. There are innumerable reasons for this situation, including relocation of students to new schools, absenteeism during the testing process, and incomplete data on a particular test or survey. During this study, researchers attempted to obtain as complete a data set as possible by: (a) sending follow-up waves of forms to parents; (b) personally administering tests and surveys or arranging for other individuals to do so in districts with large pools of subjects; (c) calling schools for additional information when necessary; (d) prelabelling all tests and surveys to ensure that returned instruments were properly identified; (e) offering incentives for returned data; and (f) providing Spanish translations of parent questionnaires sent to sites with extensive Hispanic populations. Despite these efforts some data remain missing. This unavoidably and irremediably reduces the sample size for all analyses.

The variable of racial/ethnic status contained only two levels, Caucasian and African-American. Districts in large urban areas representing diverse cultural groups were recruited for the study, as were schools in geographic regions with a Mexican-American population. Unfortunately, the low representation of Hispanic students prevented the inclusion of this ethnic group in the statistical analyses. Needless to say, ethnic groups with even smaller numbers of participants could not be incorporated into this study.

The researchers identified three to four example programs for each program type in order to provide a reasonable check on idiosyncratic program confounds and improve the robustness of study findings. This does not overcome the uncontrollable differences between programs including goals, curriculum, teacher preparation, financial and administrative support , and parent involvement.

Students in gifted programs were compared to students of similar ability in school districts which did not provide gifted programs prior to the sixth grade. This comparison avoided the potential ethical and legal problems of identifying students who meet criteria for their school's gifted program, but must be excluded in order to serve as control subjects. Students in this Gifted Comparison Group were selected for the project by teacher nomination, largely based on performance in reading and mathematics. While these criteria were not as comprehensive as the identification procedures used to select the gifted students participating in the study, it is important to note that the school administrators selected students for the gifted comparison group with the intention of targeting them for inclusion in their gifted programs at a later date. The Nongifted Comparison Group was composed of average to above average ability students. Thus, the students performing below average or those with learning difficulties were not participants in the study.

The purpose of this study was not to ascertain which program was "best," but to improve our understanding of the effects of gifted programs on student academic and affective outcomes. Decisions about which type of program to institute require a cost-benefits analysis that involves factors beyond the scope of this study. A school district must consider available financial and human resources, as well as make value judgments about its goals for gifted and talented students. Beyond these factors, this study provided valuable information on student learning outcomes that can be used to guide rational decision-making in choosing among the various types of gifted programs.

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Appendix A

Program Demographic Information

Program Demographic Information

Code	Grade Level 1990-91 1991-92	Program Type	% Of School District Served In Program	% Of Ethnic Groups In District/ % In Program	Type of District, Total Population, and Size
A	2/3	Special School	6.5% estimate	88% African-American, 8% Caucasian, 2% Hispanic, .73% Asian, .33% Native-American, 96% African-American, 3% Caucasian, 1% Other	Urban Pop.- 1,222,120 Square Miles- 191.1
B	2/3	Special School	3-5%	.94% Hispanic, 6% Caucasian, .24% African-American, .09% Asian, .01% Native-American, 93% Hispanic, 7% Caucasian	Rural/ Suburban Pop.- 29,885 Square Miles- 945
C	3/4	Special School	270 students total 6-7%	55% African-American, 33% Caucasian, 8% Hispanic, 2.7% Asian, 1.1% Native-American, 55% African-American, 42% Caucasian, 3% Hispanic, and Other	Urban Pop.- 685,046 Square Miles- 113.4
D	2/3	Separate Class	12% (3-20%)	64% African-American, 30% Caucasian, 3.8% Asian, 2.5% Hispanic, .3% Native-American, 50% African-American, 35% Caucasian, 10% Asian, 5% Hispanic	Suburban, Urban, Rural Pop.- 729,268 Square Miles- 486.4
E	2/3	Separate Class	6%	98% Hispanic, 2.2% Caucasian, .1% African-American, 98% Hispanic, 2% Caucasian	Rural Pop.- 12,694 Square Miles- 7.4

Program Demographic Information (continued)

Code	Grade Level 1990-91 1991-92	Program Type	% Of School District Served In Program	% Of Ethnic Groups In District/ % In Program	Type of District, Total Population, and Size
G	3/4	Separate Class	20% estimated by school district	60% Caucasian, 38% African-American, 1% Asian, less than 1% other, 82% Caucasian, 17% African-American, less than 1% Other	Urban Pop.- 96,397 Square Miles- 42.9
H	2/3	Pull-Out	12% (3-20%)	64% African-American, 30% Caucasian, 3.8% Asian, 2.5% Hispanic, .3% Native-American, 50% African-American, 35% Caucasian, 10% Asian, 5% Hispanic	Suburban, Urban, Rural Pop.- 729,268 Square Miles- 486.4
I	2/3	Pull-Out	12-13%	53% Caucasian, 46% African-American, less than 1% other, unavailable for gifted program	Rural Pop.- 59,567 Square Miles- 455.5
J	4	Pull-Out	District is unable to provide this information	66% Caucasian, 30% African-American, less than 1% other/ district unable to provide gifted program information	Rural, Suburban Pop.- 15,519 Square Miles- 113.8
K	2/3	Pull-Out	3% 1990-91 5% 1991-92	61% Caucasian, 38% African-American, less than 1% Other, district unable to provide gifted program information	Urban Pop.- 206,056 Square Miles- 60.1

Program Demographic Information (continued)

Code	Grade Level 1990-91 1991-92	Program Type	% Of School District Served In Program	% Of Ethnic Groups In District/ % In Program	Type of District, Total Population, and Size
L	2/3	Within-Class	12% (3-20%)	64% African-American, 30% Caucasian, 3.8% Asian, 2.5% Hispanic, .3% Native-American, 50% African-American, 35% Caucasian, 10% Asian, 5% Hispanic	Suburban, Urban, Rural Pop.- 729,268 Square Miles- 486.4
M	2/3	Within-Class	15% (type I, II) 5-10% (type III)	88.31% African-American, 8.32% Caucasian, 2.31% Hispanic, less than 1% other/ greater than 50% African-American	Urban Pop.- 1,222,120 Square Miles- 191.1
N	3/4	Within-Class	Type I - all 20% (Type II) n/a (Type III)	97% Caucasian, 2% African-American, less than 1% other/ District is unable to provide this information.	Suburban, Urban Pop.- 126,137 Square Miles- 49.7
O	2/3	Within-Class	18%	78% Caucasian, 11% African-American, less than 1% other/ 93% Caucasian, 4.5% African-American, 2.5% Other	Rural, Suburban Pop.- 68,040 Square Miles- 72.28
P	2/3	Gifted Comparison Group	n/a	n/a	Suburban, Urban Pop.- 18,458 Square Miles- 12.9
Q	2/3	Gifted Comparison Group	n/a	n/a	Rural Pop.- 65,585 Square Miles- 42.1
R	2/3	Gifted Comparison Group	n/a	n/a	Suburban Pop.- 29,387 Square Miles- 6.5

Appendix B

Program Profiles

Program Profiles

Code	Grade Level 1990-91 1991-92	Program Type	Identification Methods	Instructional Models	Program Options	Construct	Content
A	2/3	Special School	Baldwin Matrix- B or better in reading and mathematics 85th percentile or better on standardized achievement tests Parent and teacher checklist	Enrichment Triad Model	Future Problem Solving	Academically gifted	Creative and critical thinking Acquired basic content through process activities Develop leadership skills, decision making skills, and a realistic and positive self concept
B	2/3	Special School	Raven's Progressive Matrices California Achievement Test Scales for Rating Behavioral Characteristics of Superior Students Grades from previous tests of cognitive abilities	Sandra Kaplan's Grid Model	Advanced academic learning program	Academically gifted	Multidisciplinary focus Thinking skills Creativity

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Program Profiles (continued)

Code	Grade Level 1990-91 1991-92	Program Type	Identification Methods	Instructional Models	Program Options	Construct	Content
C	3/4	Special School	Nominated by teachers in the public school system based on achievement, creativity, advanced social skills. Racial/ethnic balance in school district is maintained		Acceleration Enrichment Research projects	General academic ability Creativity Leadership Arts	language Arts, sciences, Social Studies, Mathematics problem solving Divergent thinking skills Critical thinking skills
D	2/3	Separate Class	Otis Lennon 10 point checklist for teacher observations Project Step-Up for minority students Performance	Basic Curriculum Sandra Kaplan's Grid Model Modified Enrichment Triad Model	Odyssey of the Mind Acceleration Enrichment Computer Science Foreign Language External programs with business and community Interrelated arts program - independent study	General intellectual ability Special consideration to academic aptitude, creative, or leadership abilities	Advanced Academics Higher level thinking skills Language Arts Theme based units

Program Profiles (continued)

Code	Grade Level 1990-91 1991-92	Program Type	Identification Methods	Instructional Models	Program Options	Construct	Content
E	2/3	Separate Class	Patent and teacher checklist Test scores Grades Products	None specified	Creativity training Future Problem Solving Odyssey of the Mind	Academically gifted General intellectual ability	subject area specific, Critical thinking, Creativity, Self-understanding, Communication skills
G	3/4	Separate Class	90th percentile in specific academic subjects 90th percentile on academic indicators (EAS or COGAT) 15-30 points above school means Teacher referral		Acceleration Enrichment Cluster grouping or individual differentiation	General intellectual ability Specific academic aptitude	Subject matter oriented

Program Profiles (continued)

Code	Grade Level 1990-91 1991-92	Program Type	Identification Methods	Instructional Models	Program Options	Construct	Content
H	2/3	Pull-out	Otis Lennon 10 point checklist for teacher observation Project Step-Up for minority students	Base curriculum Sandra Kaplan's Grid Model Modified Enrichment Triad Model	Odyssey of the Mind Acceleration Enrichment Computer Science Foreign Language External programs with business and community Interrelated arts program - independent study	General intellectual ability Special consideration to academic aptitude, creative, or leadership abilities	Advanced Academics Higher level thinking skills Language Arts Theme-based units
I	2/3	Pull-Out	Aptitude test Achievement test Student background information Total profile	Unit approach	Resource room Enrichment Triad Model Talents Unlimited Creativity training	Academically gifted General intellectual ability	Concept-based content Thinking skills development

Program Profiles (continued)

Code	Grade Level 1990-91 1991-92	Program Type	Identification Methods	Instructional Models	Program Options	Construct	Content
J	4	Pull-Out	Aptitude test Intelligence test Achievement test Weighted Profile	Academic and Creative enrichment		Academically gifted Visual Arts	Social Studies Affective development Communication skills Research Computer lab Thinking skills
K	2/3	Pull-Out	Achievement test Ability test Teacher evaluation Grades Creativity test	Academic and creative programming	Talents Unlimited Mind Games (similar to Odyssey of the Mind)	Academically gifted General intellectual ability	Thematic based differentiated curriculum units which are skills oriented Convergent thinking skills, divergent thinking skills, evaluation, investigatory skills, independent learning, and data management skills

Program Profiles (continued)

Code	Grade Level 1990-91 1991-92	Program Type	Identification Methods	Instructional Models	Program Options	Construct	Content
L	2/3	Within-Class	Otis Lennon 10 point checklist for teacher observation Project Step-Up for minority students	Sandra Kaplan's Grid model Modified Triad	Higher level thinking skills Odyssey of the Mind Independent Study Junior Great Books	General intellectual ability Special consideration given to creative or productive thinking, and leadership abilities	Higher level thinking skills Theme-based curriculum
M	2/3	Within-Class	District developed nomination form Teacher Rating Scale Writing activity Talent Pool	Modified Enrichment Triad Model	Enrichment Triad Model Curriculum Compacting Mentors	General academic ability Creativity	Triad base in all content area Algebraic concepts Work within the regular classroom
N	3/4	Within-Class	Standardized creativity test Achievement test ability test Talent Pool	Modified Enrichment Triad Model	Curriculum Compacting Enrichment Triad Model Resource room Works within the regular classroom	General intellectual ability or, Specific intellectual ability or, Visual and Performing Arts or, Creativity	Triad based

Program Profiles (continued)

Code	Grade Level 1990-91 1991-92	Program Type	Identification Methods	Instructional Models	Program Options	Construct	Content
O	2/3	Within-Class	Achievement tests in Language Arts and Mathematics Teacher evaluation	Comprehensive school mathematics program Language Arts program	Enrichment	Specific academic ability Mathematical ability Linguistic ability	Language Arts Mathematics Self-directed learning Contributors of knowledge, Self-understanding, Effective interpersonal relationships, Logical reasoning, Problem solving, Critical and creative reading, Oral and written expression
P	2/3	Gifted Comp. Group	Reading and mathematics grades and test scores	None for gifted education	None	None	None
Q	2/3	Gifted Comp. Group	Reading and mathematics grades and test scores	None for gifted education	None	None	None
R	2/3	Gifted Comp. Group	Reading and mathematics grades and test scores	None for gifted education	None	None	None

Note: Gifted Comp. Group refers to the Gifted Comparison Group.

Appendix C

Validity and Reliability of Selected Instruments for Gifted Students

Validity and Reliability of Selected Instruments for Gifted Students

The applicability of specific instruments for high ability students was examined. Results of an investigation of confirmatory factor analysis are reviewed and internal consistency reliability estimates of the selected instruments are reported with respect to the norm group and the sample of gifted students.

Factorial Validity of the Instruments Assessing Self-Perception, and Intrinsic/Extrinsic Motivation

Prior to conducting investigations into the reliability of instruments used in this study, validity studies for the scales of self-perception and motivation were undertaken. These analyses were conducted by Goldberg (1994) with a sample of 975 students. The confirmatory factor analyses used maximum likelihood factor extraction followed by Procrustean rotations. He investigated distinctions between self-perception using the Self-Perception Profile for Children (1985) and motivation employing the instrument for Intrinsic Versus Extrinsic Orientation in the Classroom (Harter, 1980). Student responses to these variables were analyzed according to racial/ethnic status (Caucasian or non-Caucasian), grade level (2 or 3), education status (gifted or regular education) and sex. The factor analyses included 32 items comprising the 4 motivation scales (Internal Criteria for Success/Failure, Independent Judgment, Independent Mastery, and Preference for Challenge) and 2 scales of self-perception (Social Acceptance and Scholastic Competence). As predicted, analyses yielded 6 factors across all groups. Distinctions among the four subscales for intrinsic/extrinsic motivation were supported, as was the distinction between the measures of self-perception and motivation. Unfortunately, the results of the factor analytic studies for Social Acceptance and Scholastic Competence revealed that these constructs were not as distinct for the sample of second and third grade children, as indicated by lower item loadings on the preconceived factors (see Goldberg, 1994).

Reliability of the Instruments Assessing Achievement, Attitudes, Self-Perception, and Intrinsic/Extrinsic Motivation Related to the Total Sample of Gifted Students

Procedures for estimating reliability coefficients are described by Tabachnick and Fidell (1989). High coefficients are preferred, but it remains difficult to determine one criterion for interpreting results about the relationship between an instrument and a population. Guidelines include examining estimates based on expectations for a particular construct. Alpha coefficients of .70 and above are acceptable levels for internal consistency reliability estimates for affective instruments (Gable, 1986) and standardized achievement tests (Morris & Fitz-Gibbon, 1978). The internal consistency reliability coefficients from this study were compared to the values for the norm groups for all measures as well as to the acceptable level of .70. Stability estimates were also calculated, providing data related to changes in student achievement and perceptions over time. It should be noted here that the researchers did not expect to find high ratability estimates since it was anticipated that the program would have an effect on the students, hence producing a change in student responses over a one year period.

These data were collected during the fall of 1990 and spring of 1991. The sample contained a total of 695 students in grades 2, 3, and 4. There were 325 males and 370 females. Racial/Ethnic distribution included 186 African-Americans, 436 Caucasian students, and 46 Hispanic children. Refer to Delcourt, Loyd, Moon, Perie, and Bland

(1993) and Goldberg (1994) for additional discussion of measurement issues related to data from the first year of the study.

The results are divided into two sections. The first section reviews the data about the gifted sample as a whole, while the second section focuses on results for racial/ethnic status.

Achievement. Internal consistency reliability coefficients are based on raw scores for the total gifted student sample. Administration of the Iowa Tests of Basic Skills (Hieronymous, Hoover, & Lindquist, 1986) in the fall of 1990 resulted in the following ranges of internal consistency reliability coefficients across subtests for Form J: .76-.90 for Level 8 (Grade 2); .83-.96 for Level 9 (Grade 3); .79-.96 for Level 10 (Grade 4). For the spring testing period of 1991, internal consistency reliability estimates for Form G/H ranged from .83-.86 for Level 8, .78-.91 for Level 9, and .75-.94 for Level 10. Results from the fall 1990 testing period can only be compared to a spring national norm group for Form J. Consequently, mean scores from the standardization sample may be slightly higher than those from this study. For Form J, the internal consistency reliability estimates reported by the authors of the instrument ranged from .66 to .91 for Level 8 (Grade 2), .86 to .92 for Level 9 (Grade 3), and .86 to .93 for Level 10 (Grade 4). Coefficients for Form G/H were .69 to .92 for Level 8 (Grade 2), .77 to .93 for Level 9 (Grade 3), and .75 to .92 for Level 10 (Grade 4). For this sample, the following stability estimates were derived from grade equivalent scores: Level 8 (r = .40-.74), Level 9 (r = .62-.78), and Level 10 (r = .35-.49).

The internal consistency reliability estimates reported for the total group of gifted students across achievement subscales were relatively high. A majority of these estimates was above a value of .80. Stability estimates ranged from .35 to .78 over a six to seven-month period, with higher gains in achievement being related to lower coefficients.

Attitudes toward learning. The Arlin-Hills assessment of Attitudes Toward Learning Processes was employed in these analyses (1976). For this sample, reliability coefficients for all students in grades 2 through 4 ranged from .80 to .86, while an estimate of .90 was reported by the authors for students in grades 1 through 12 (Arlin, 1976). The overall alpha coefficient for the spring was higher (.86) than that estimated from the fall (.80). Comparing student scores from fall to spring of the 1990-1991 school year, a Pearson correlation of .56 (n = 621, $p < .001$) was produced.

Self-perception. On the Harter Self-Perception Profile for Children (Harter, 1985), internal consistency reliability estimates were .63 for Social Acceptance (SA) and .67 for Scholastic Competence (SC) in the fall. For the spring, the coefficients were .64 for SA and .76 for SC. Only the coefficient for SC in the spring administration was above the target value of .70. Ranges for the standardization sample were .80-.85 for SC and .75-.80 for SA. The SC subscale was more stable over time, r = .56 (n = 382, $p < .001$), as compared to the SA scale, r= .44 (n = 380, $p < .001$).

Intrinsic/extrinsic motivation. Internal consistency reliability estimates across subscales for Harter's Intrinsic Versus Extrinsic Orientation in the Classroom survey (1980) ranged from .72 to .80 (fall) and .75 to .83 (spring). These estimates are within the range of alpha coefficients for the standardization sample which ranged from .68 to .84. All values were also above a minimum level of r = .70. Estimating the stability of scores from fall to spring resulted in the following correlations for each subscale: Independent Mastery vs. Pleasing the Teacher (IM), r = .45, n = 384, $p < .001$; Independent judgment vs. Reliance on the Teacher's Judgment (IJ), r = .45, n = 384, $p < .001$; Preference for Challenge vs. Preference for Easy Work Assigned (PC), r = .53, n = 386, $p < .001$;

Internal Criteria for Success/Failure vs. External Criteria (IC), $r = .49$, $n = 388$, $p < .001$. These low to moderate values indicate that the means for each subscale changed over time.

Reliability of the Instruments Assessing Achievement, Attitudes, Self-Perception, and Intrinsic/Extrinsic Motivation Related to Gifted Students with Respect to Racial/Ethnic Status

Achievement. Internal consistency estimates for all achievement subtests across racial/ethnic groups were relatively consistent with those of the norm group for the fall and the spring. For the fall, estimates across levels and subtests ranged from .59 to .94 for African-Americans, .76 to .97 for Caucasians, and .64 to .91 for Hispanic students. Coefficients for the spring ranged from .63 to .91 for African-Americans and .70 to .95 for Caucasians. Most spring values for Hispanic students were not available. For Form J, the internal consistency reliability estimates reported by the authors ranged from .66 to .93. Coefficients for Form G/H, used in the spring, ranged from .69 to .93. Internal consistency estimates were calculated from raw scores. Stability estimates from fall to spring were derived from grade equivalent scores. Stability indices were: .48-.75 (Level 8) and .54-.76 (Level 9) for African-Americans; .31-.70 (Level 8), .51-.67 (Level 9), and .34-.51 (Level 10) for Caucasians; and .12-.68 (Level 8) for Hispanic students. Due to low sample size, correlations for African-Americans at Level 10 and for Hispanics at Levels 9 and 10 were not available.

Attitudes toward learning. During the fall, internal consistency reliability estimates were .78 for African-Americans, .82 for Caucasians, and .65 for Hispanic students. Spring estimates included values of .83 for African-Americans, .88 for Caucasians, and .79 for Hispanic students. The reported coefficient for the norm group was .90 across grade levels 1 through 12 (Arlin, 1976). For this sample, stability indices were .56 ($n = 385$, $p < .001$) for Caucasians and .60 ($n = 165$, $p < .001$) for African-Americans. Indices for Hispanic students were not available because of the small sample from that population.

African-American students had the highest mean score on the attitudes toward learning scale during the fall and the spring. Since this survey's authors believe that scores over 30 indicate a positive attitude, students in all three racial/ethnic groups view their classrooms and their learning environments favorably. Compared to scores for Caucasian and African-American students, the instrument was not as internally consistent for Hispanic students during the first round of testing.

Self-perception. For these subscales, fall estimates of internal consistency reliability ranged from .55 to .62 for African-Americans, .68 to .70 for Caucasians, and .48 to .57 for Hispanic students. In the spring, coefficients ranged from .55 to .76 for African-Americans, .69 to .76 for Caucasians, and .50 to .71 for Hispanics. Alpha coefficients for the norm group varied from .75 to .85 across the subscales of SC and SA (Harter 1985). In this study, stability estimates for Scholastic Competence from fall to spring were .62 ($n = 216$, $p < .001$) for Caucasians and .47 ($n = 121$, $p < .001$) for African-Americans. For Social Acceptance, correlations of scores over the two testing periods were .49 ($n = 214$, $p < .001$) for Caucasians and .37 ($n = 121$, $p < .001$) for African-Americans. Stability estimates for Hispanic students were not calculated due to the small sample.

For the two assessments of self-perception, Scholastic Competence and Social Acceptance, the internal consistency reliability coefficients always followed the pattern of having the highest values for Caucasian students and the lowest values for Hispanic respondents. For the African-American and Hispanic students in this sample, the internal

consistency reliability estimates for SA were quite low and only approached the acceptable level of .70 for Caucasian students. All values for the SC scale were above the .70 guideline for the spring testing period. However, the coefficients were lower than .70 for African-American and Hispanic students in the fall.

Intrinsic/extrinsic motivation. For this sample, an examination of the alpha coefficients across the three racial/ethnic groups for the Intrinsic Versus Extrinsic Orientation in the Classroom inventory (Harter, 1980) revealed that fall values for African-American students (r = .62 - .75), Caucasian students (r = .72 - .84), and Hispanic Students (r = .65 - .71) were similar to those for the standardization sample (r = .68 - .84). Spring values for African-American students (r = .73 - .78), Caucasian students (r = .74 - .87), and Hispanic Students (r = .59 - .82) were also similar to those for the standardization sample (r = .68 - .84), with most being above an acceptable level of .70. The only coefficient lower than the two mentioned guidelines is the scale of Independent Judgment vs. Reliance on the Teacher's Judgment (IJ) for Hispanic students. The stability indices of these four subscales from fall to spring were: Independent Mastery vs. Pleasing the Teacher, r = .50, n = 217 (Caucasian), r = .35, n = 124 (African-American); Independent judgment vs. Reliance on the Teacher's Judgment, r = .48, n = 218 (Caucasian), r = .32, n = 121 (African-American); Preference for Challenge vs. Preference for Easy Work Assigned, r = .61, n = 220 (Caucasian), r = .42, n = 121 (African-American); Internal Criteria for Success/Failure vs. External Criteria, r = .46, n = 221 (Caucasian), r = .53, n = 122 (African-American). All values were significant at the .001 probability level. Correlations for Hispanic students were not available due to the small sample.

Summary

This was an investigation of the factor analytic validity and the reliability of specific instruments for use with gifted students. The data should not be generalized to any other instruments because the purpose and construction of every assessment tool varies. The instruments assessing achievement, attitudes toward learning processes, and intrinsic/extrinsic motivation were reliable for this sample of gifted students across racial/ethnic status. The Scholastic Competence (SC) subscale had acceptable levels of reliability, although these were slightly lower than the estimates for the standardization group. Likewise, internal consistency reliability estimates for the Social Acceptance (SA) subscale were not as high as expected. Coupled with the lower loadings from the factor analysis procedures, results from the self-perception subscales, particularly that of SA, should be interpreted with caution for young children. While conceptions of affective development are not easily measured in any population (Gable, 1986), perhaps a domain-specific approach does not yield highly accurate and reliable results until children reach a particular developmental stage. Three studies contribute to this developmental perspective using Harter's scales of self-perception for young children: (a) for a sample of second and third grade students, the Learning Outcomes Study produced internal consistency reliability estimates of .67 to .76 and .63 to .64 for SC and SA, respectively (Delcourt et al., 1992) and a correlation of .46 between SC and SA (Goldberg, 1994); (b) Harter (1985) published reliability estimates ranging from .80 to .85 for SC and .75 to .80 for SA in a sample of third and fourth graders with correlations between subscales reportedly from .44 to .63.; (c) in a sample of fifth through eighth grade high ability students, Hoge and McSheffrey (1991) found alpha coefficients of .86 for SC and .89 for SA with a correlation of .15 between these two subscales. Apparently, over time, these constructs of self-perception become more reliable and distinct.

There are reliable instruments for assessing a variety of high ability children. Unfortunately, the review of these assessment tools also highlights the fact that many published instruments do not include results pertaining to students with a wide range of abilities or those from a variety of ethnic groups. It is essential that researchers thoroughly research measurement issues related to the population under investigation if they are to gather useful and credible evidence for appropriate interpretation and use of testing data.

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Appendix D

Student Activities Survey

STUDENT ACTIVITIES SURVEY

The purpose of this survey is to become more familiar with some of the interests and activities of students the age of your child. This is not a test and there are no correct or incorrect answers. All responses will be kept completely confidential.

There are two sections to this survey. Section One lists many specific activities and Section Two is a survey of student projects.

SECTION ONE

Directions: **Please complete this survey with your child.**

CHECKLIST

Check all of the activities below which your child does on a regular basis. Then estimate the number of hours your child spent doing each activity in the past two weeks.

Regular activity		Approximate hours in past two weeks
_____	Doing routine homework	_____
_____	Working on a special school project (e.g., science fair)	_____
_____	Studying a topic of personal interest (e.g., science, history)	_____
_____	Reading for pleasure	_____
_____	Watching television	_____
_____	Playing video games (e.g., nintendo)	_____
_____	Using a computer (not video games)	_____
_____	Playing sports on a team	_____
_____	Playing with friends	_____
_____	Playing with brothers or sisters	_____
_____	Pursuing a hobby or adding to a collection (please list)	_____
	Other activity (please list)	
_____	_____	_____
	Other activity (please list)	
_____	_____	_____

SECTION ONE (continued)

Regular activity		Approximate hours in past two weeks
_____	Creative writing	_____
_____	Music	_____
_____	Dance	_____
	Other artistic activity (please list)	
_____	_____	_____
	Club/group involvement (please list)	
_____	_____	_____
_____	_____	_____
	Other special activities (please list)	
_____	_____	_____
_____	Drama	_____

SECTION TWO

Read each question and place a check in the space before each statement which best describes your child's participation in the activity. Provide a description of the activity when necessary.

1. Has your child submitted an original piece of work (i.e., an article, a description of an experiment) to a journal, magazine or school or local newspaper, etc.?

_____ Yes _____ No

If yes, please complete the following information. If no, go to question #2.

_____ My child has submitted original work for publication in the past

Number of times _____

Title of work(s) _____

_____

Place(s) submitted _____

_____

Please check one of the following-

This was completed:

____ as a regular classroom assignment

____ as a project in a special program

____ on his/her own, it was not a class assignment or part of a special program

_____ My child is presently working on this type of project

____ Title or description of work _____

_____

____ Place my child plans to submit work_____

_____

Number of hours spent working on project in past two weeks_____

Please check one of the following-

My child is completing this:

____ as a regular classroom assignment

____ as a project in a special program

____ on his/her own, it is not a class assignment or part of a special program

SECTION TWO (continued)

2. Have you ever received an award? _____ Yes _____ No

If yes ...

_____ I participated in this type of activity, but won no award

_____ I received an honorable mention

_____ I won second or third place

_____ I came in first place

Which awards have you received?_____

_____

3. Does your child develop computer programs? _____ Yes _____ No

If yes ...

_____ My child has written a computer program in the past

Number of times_____

Title of program(s)_____

_____

Please check one of the following-

My child has completed this:

____ as a regular classroom assignment

____ as a project in a special program

____ on his/her own, it was not a class assignment or part of a special program

_____ My child is presently writing a computer program

Title or description of program_____

_____

Number of hours spent working on project in past two weeks_____

Please check one of the following-

My child is completing this:

____ as a regular classroom assignment

____ as a project in a special program

____ on his/her own, it is not a class assignment or part of a special program

SECTION TWO (continued)

4. Have you ever completed a research project? _____ Yes _____ No

If yes ...

_____ My child has completed a research project in the past

Number of times_____

Title of research project(s)_____

_____

Place(s) results were presented_____

_____

Please check one of the following-

My child completed this:

____ as a regular classroom assignment

____ as a project in a special program

____ on his/her own, it was not a class assignment or part of a special program

____

_____ My child is presently working on this type of project

Title or description of research project_____

_____

Place he/she plans to present work_____

_____

Number of hours spent working on project in past two weeks_____

Please check one of the following-

My child is completing this:

____ as a regular classroom assignment

____ as a project in a special program

____ on his/her own, it is not a class assignment or part of a special program

Appendix E

National Norm Group Results for ITBS Achievement Grade Equivalent (G.E.) Scores

National Norm Group Results for Achievement Grade Equivalent (G.E.) Scores

Subtest [a]	Grade Equivalent Scores			
	Grade 2	Grade 3	Mean for Grade 2 & 3	Grade 4
Mathematics Concepts				
50th Percentile	30	39	35	49
90th Percentile	36	46	41	57
Mathematics Problem Solving				
50th Percentile	30	39	35	48
90th Percentile	35	46	41	56
Reading Comprehension				
50th Percentile	29	39	34	49
90th Percentile	36	47	42	56
Science				
50th Percentile	29	39	34	48
90th Percentile	40	52	46	63
Social Studies				
50th Percentile	29	38	34	48
90th Percentile	42	52	47	62

[a] Iowa Tests of Basic Skills. A score of 37 refers to the third grade, seventh month of school (March).

Appendix F
Results of Student-Newman-Keuls Analyses for Research Question #1

Table 1.1

Results of Student-Newman-Keuls Analyses for the Iowa Tests of Basic Skills Across Four Levels of Program Type[a]

Group Differences	ANCOVA Signif. of F
Mathematics Concepts	.001***
Separate Class > WC**	
Pull-Out > WC**	
Special School > WC*	
Mathematics Problem-Solving	.000***
Pull-Out > WC**, SS*	
Separate Class > WC**	
Reading Comprehension	.000***
Pull-Out > WC**[b]	
Separate Class > WC**	
Special School > WC**	
Science	.001***
Pull-Out > WC**	
Social Studies	.000***
Separate Class > WC**	
Pull-Out > WC**	
Special School > WC**	

a Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

b Program types are listed in ascending order of mean values.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Key: SS- Special School; SC- Separate Class; PO- Pull-Out Program; WC- Within-Class Program; GCG- Gifted Comparison Group; NGCG- Nongifted Comparison Group.

Table 1.2

Results of Student-Newman-Keuls Analyses for the Self-Perception Profile for Children Scores Across Four Levels of Program Type[a]

Group Differences	ANCOVA Signif. of F
Scholastic Competence	.000***
Pull-Out > SC**[b], SS*	
Within-Class > SC**	

a Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

b Program types are listed in ascending order of mean values.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Key: SS- Special School; SC- Separate Class; PO- Pull-Out Program; WC- Within-Class Program; GCG- Gifted Comparison Group; NGCG- Nongifted Comparison Group.

Table 1.3

Results of Student-Newman-Keuls Analyses for Intrinsic Versus Extrinsic Orientation in the Classroom Across Four Levels of Program Type[a]

Group Differences	ANCOVA Signif. of F
Independent Mastery	
Pull-Out > SC**[a]	.003**
Within-Class > SC*	
Preference for Challenge	.003**
Pull-Out > SC**[b]	
Within-Class > SC*	

a Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

b Program types are listed in ascending order of mean values.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Key: SS- Special School; SC- Separate Class; PO- Pull-Out; WC- Within-Class; GCG- Gifted Comparison Group; NGCG- Nongifted Comparison Group.

Appendix G

Results of Student-Newman-Keuls Analyses for Research Question #2

Table 2.1

Results of Student-Newman-Keuls Analyses for the Iowa Tests of Basic Skills Across Six Levels of Program Type[a]

Group Differences	ANCOVA Signif. of F
Mathematics Concepts	.000***
Separate Class > GCG**, WC**	
Pull-Out > GCG**, WC**	
Nongifted Comparison Group > GCG**, WC**	
Special School > GCG**, WC*	
Mathematics Problem-Solving	.000***
Pull-Out > GCG **, WC**, SS*, NGCG*	
Separate Class > GCG**, WC**	
Nongifted Comparison Group > GCG**, WC**	
Special School > GCG*	
Reading Comprehension	.000***
Pull-Out > WC**[b], GCG**, NGCG**	
Special School > WC*, GCG*	
Separate Class > WC*	

a Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

b Program types are listed in ascending order of mean values.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Key: SS- Special School; SC- Separate Class; PO- Pull-Out; WC- Within-Class; GCG- Gifted Comparison Group; NGCG- Nongifted Comparison Group.

Table 2.1 (continued)

Results of Student-Newman-Keuls Analyses for the Iowa Tests of Basic Skills Across Six Levels of Program Type[a]

Group Differences	ANCOVA Signif. of F
Science	.000***
Pull-Out > GCG**, WC**, NGCG**	
Special School > GCG*	
Separate Class > GCG*	
Social Studies	.000***
Separate Class > WC**, GCG**, NGCG**	
Pull-Out > WC**, GCG**, NGCG**	
Special School > WC*	

a Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

b Program types are listed in ascending order of mean values.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Key: SS- Special School; SC- Separate Class; PO- Pull-Out; WC- Within-Class; GCG- Gifted Comparison Group; NGCG- Nongifted Comparison Group.

Table 2.2

Results of Student-Newman-Keuls Analyses for the Self-Perception Profile for Children Scale Across Six Levels of Program Type[a]

Group Differences	ANCOVA Signif. of F
Scholastic Competence	.000**
Pull-Out > SC**[b]	
Within-Class > SC**	
Gifted Comparison Group > SC*	
Nongifted Comparison Group > SC*	
Special School > SC*	

a Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

b Program types are listed in ascending order of mean values.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Key: SS- Special School; SC- Separate Class; PO- Pull-Out; WC- Within-Class; GCG- Gifted Comparison Group; NGCG- Nongifted Comparison Group.

Table 2.3

Results of Student-Newman-Keuls Analyses for the Intrinsic Versus Extrinsic Orientation in the Classroom Scale Across Six Levels of Program Type[a]

Group Differences	ANCOVA Signif. of F
Independent Judgment	.021*
Special School > NGCG**[b]	
Within-Class > NGCG**	
Independent Mastery	.013*
Pull-Out > SC**, GCG*	
Within-Class > SC*	
Nongifted Comparison Group > SC*	
Preference for Challenge	.005**
Gifted Comparison Group > SC**	
Pull-Out > SC**	
Nongifted Comparison Group > SC**	
Within-Class > SC*	

a Values are based on procedures comparing fourth round scores after adjusting for initial differences in social status and first round scores.

b Program types are listed in ascending order of mean values.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Key: SS- Special School; SC- Separate Class; PO- Pull-Out; WC- Within-Class; GCG- Gifted Comparison Group; NGCG- Nongifted Comparison Group.

Table 2.4

Results of Student-Newman-Keuls Analyses for Attitudes Toward Learning Processes Across Six Levels of Program Type[a]

Group Differences	ANCOVA Signif. of F
Special School > SC**[b], PO**, NGCG**, WC*	.048***

a Values are based on procedures comparing fourth round scores after adjusting for initial differences in first round scores. The variable of Racial/Ethnic Status was not included in these analyses.

b Program types are listed in ascending order of mean values.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Key: SS- Special School; SC- Separate Class; PO- Pull-Out; WC- Within-Class; GCG- Gifted Comparison Group; NGCG- Nongifted Comparison Group.

Table 2.5

Results of Student-Newman-Keuls Analyses for the Scale for Rating Behavioral Characteristics of Superior Students Across Six Levels of Program Type[a]

Group Differences	ANCOVA Signif. of F
Creativity	.039*
Within Class > SS**	
Pull-Out > SS**	
Learning	.000***
Pull-Out > SS**[b], SC**, NGCG*	
Gifted Comparison > SS**	
Within Class > SS**	
Motivation	.002**
Gifted Comparison > SS**	
Pull-Out > SS**	
Within Class > SS**	
Nongifted Comparison > SS*	

a Values are based on procedures comparing fourth round scores after adjusting for initial differences in first round scores. The variable of Racial/Ethnic Status was not included in these analyses.

b Program types are listed in ascending order of mean values.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Key: SS- Special School; SC- Separate Class; PO- Pull-Out; WC- Within-Class; GCG- Gifted Comparison Group; NGCG- Nongifted Comparison Group.

Appendix H

Results of Student-Newman-Keuls Analyses for Research Question #3

Table 3.1

Results of Student-Newman-Keuls Analyses for the Iowa Tests of Basic Skills in Mathematics Concepts Following a Significant Interaction for Program Type x Time[a]

Group Differences	ANCOVA Signif. of F
Spring 1991	.000***
Special School > NGCG**[b], GCG**, WC**, SC**, PO*	
Pull-Out > NGCG**, GCG**, WC*	
Separate Class > NGCG**	
Within-Class > NGCG**	
Fall 1991	.000***
Special School > GCG**, NGCG**, WC**	
Pull-Out > GCG**, NGCG**, WC**	
Separate Class > GCG**, NGCG**, WC**	

a Values are based on procedures comparing second and third round scores after adjusting for initial differences in social status.

b Program types are listed in ascending order of mean values.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Key: SS- Special School; SC- Separate Class; PO- Pull-Out; WC- Within-Class; GCG- Gifted Comparison Group; NGCG- Nongifted Comparison Group.

Table 3.2

Results of Student-Newman-Keuls Analyses for the Iowa Tests of Basic Skills in Mathematics Problem Solving Following a Significant Interaction for Program Type x Time[a]

Group Differences	ANCOVA Signif. of F
Spring 1991	.000***
Special School > GCG**[b], NGCG**, WC**	
Pull-Out > GCG**, NGCG**, WC*	
Separate Class > GCG**, NGCG**, WC*	
Within-Class > GCG**, NGCG**	
Fall 1991	.000***
Pull-Out > GCG**, NGCG**, WC**	
Separate Class > GCG**, NGCG**, WC**	
Special School > GCG**, NGCG**, WC**	

a Values are based on procedures comparing second and third round scores after adjusting for initial differences in social status.

b Program types are listed in ascending order of mean values.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Key: SS- Special School; SC- Separate Class; PO- Pull-Out; WC- Within-Class; GCG- Gifted Comparison Group; NGCG- Nongifted Comparison Group.

Table 3.3

Results of Student-Newman-Keuls Analyses for the Iowa Tests of Basic Skills in Reading Comprehension Following a Significant Main Effect for Program Type[a]

Group Differences	ANCOVA Signif. of F
	.000***
Special School > GCG**[b], NGCG**, WC*	
Separate Class > GCG**, NGCG**, WC*	
Pull-Out > GCG**, NGCG**, WC*	

a Values are based on procedures comparing second and third round scores after adjusting for initial differences in social status.

b Program types are listed in ascending order of mean values.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Key: SS- Special School; SC- Separate Class; PO- Pull-Out; WC- Within-Class; GCG- Gifted Comparison Group; NGCG- Nongifted Comparison Group.

Table 3.4

Results of Student-Newman-Keuls Analyses for the Iowa Tests of Basic Skills in Science Following a Significant Interaction for Program Type x Time[a]

Group Differences	ANCOVA Signif. of F
Spring 1991	.000***
Special School > NGCG**[b], WC**, GCG**, PO*, SC*	
Separate Class > NGCG**	
Pull-Out > NGCG**	
Gifted Comparison Group > NGCG**	
Within-Class Program > NGCG**	
Fall 1991	.000***
Special School > GCG**, NGCG**, WC**	
Separate Class > GCG**, NGCG**, WC*	
Pull-Out > GCG**, NGCG**, WC*	
Within-Class > GCG**, NGCG**	

a Values are based on procedures comparing second and third round scores after adjusting for initial differences in social status.

b Program types are listed in ascending order of mean values.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Key: SS- Special School; SC- Separate Class; PO- Pull-Out; WC- Within-Class; GCG- Gifted Comparison Group; NGCG- Nongifted Comparison Group.

Table 3.5

Results of Student-Newman-Keuls Analyses for the Iowa Tests of Basic Skills in Social Studies Following a Significant Main Effect for Program Type[a]

Group Differences	ANCOVA Signif. of F
	.000***
Special School > GCG**[b], NGCG**, WC**	
Separate Class > GCG**, NGCG** WC*	
Pull-Out > GCG**, NGCG**	
Within-Class > GCG**, NGCG**	

a Values are based on procedures comparing second and third round scores after adjusting for initial differences in social status.

b Program types are listed in ascending order of mean values.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Key: SS- Special School; SC- Separate Class; PO- Pull-Out; WC- Within-Class; GCG- Gifted Comparison Group; NGCG- Nongifted Comparison Group.

Appendix I

Results of Student-Newman-Keuls Analyses for Programs Within Program Types

Table 4.1

Results of Student-Newman-Keuls Analyses for the Iowa Tests of Basic Skills in Mathematics Concepts Following Significant Main Effects for Program Across Program Type[a]

Group Differences	ANCOVA Signif. of F
Special School C > B**[b], A*	.033*
Separate Class[c]	
Pull-Out J > H**, K**	.000***
Within-Class N > M**, L**, O** O > M*	.000***

a Values are based on procedures comparing first round scores after controlling for differences in social status.

b Programs are listed in ascending order of mean values.

c Data were unavailable for Separate Classroom Programs due to a small sample size for one of the programs.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3 and Appendix A provide descriptive information about each program within the program types.

Table 4.2

Results of Student-Newman-Keuls Analyses for the Iowa Tests of Basic Skills in Reading Comprehension Following Significant Main Effects for Program Across Program Type[a]

Group Differences	ANCOVA Signif. of F
Special School C > B**[b], A**	.029*
Separate Class [c]	
Pull-Out	
Within-Class N > M**, L**, O** O > M*	.000***

a Values are based on procedures comparing achievement for first round scores after adjusting for initial differences in social status.

b Programs are listed in ascending order of mean values.

c Data were unavailable for Separate Class and Pull-Out Programs due to a small sample size for one of the programs in each program type.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3 and Appendix A provide descriptive information about each program within the program types.

Appendix J

Results of Follow-up Analyses for Repeated Measures on First and Fourth Round Scores Depicting Differences in Racial/Ethnic Status and Social Status for the Achievement of Gifted Students From Four Program Types

In order to examine the relation between social status and racial/ethnic status on achievement, follow-up analyses were conducted. A mixed factorial design was used employing a three-factor ANOVA (social status x racial/ethnic status x test administration) with repeated measures on the last dimension. This design tested changes in achievement levels from the fall of 1990 to the spring of 1992. Social status (low, medium, and high) and racial/ethnic status (African-American and Caucasian) served as the independent variables. Each subscale of the ITBS was used as a dependent variable for the five ANOVA procedures. Social status as calculated by the Hollingshead Four-Factor Index (1975) produces values on a scale of 8 through 66 points. These categories were assigned to create three groups for social status: low = 1 through 30 points; medium = 31 through 50 points; high = 51 through 66 points.

The following research question was asked in order to investigate this set of analyses: After a two-year period in a gifted program (Fall 1990 to Spring 1992), is there a difference between the achievement scores of African-American and Caucasian gifted students with respect to social status (low, medium, and high)?

Results indicated that there were no significant main effects for social status between the three categories of low, medium, and high across all levels of achievement ($p < .05$). The main effects for racial/ethnic status have already been reported (see results beginning on p. 31 of this document). There were no significant interactions between racial/ethnic status and social status across all five achievement subscales ($p < .05$). Mean values for student responses are located in Table 5.1.

These results mean that after participating in a gifted program for two years, the students showed scores in achievement which did not differ significantly across the three categories of social status regardless of their being African-American or Caucasian.

Table 5.1

First and Fourth-Round Achievement Scores[a] on the Iowa Tests of Basic Skills for Racial/Ethnic Status and Social Status[b]

	Mathematics Concepts		Mathematics Problem Solving		Reading Comprehension		Science		Social Studies	
	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)
African-American										
Low (n)	14		14		14		13		13	
Fall 1990	32.78	2.99	34.14	4.01	35.08	6.90	29.23	5.31	39.00	9.55
Spring 1992	47.42	5.44	48.08	6.10	49.02	6.01	53.29	7.62	55.27	5.77
Medium (n)	42		42		41		41		39	
Fall 1990	30.61	8.53	30.33	9.22	31.76	11.02	27.68	15.15	34.22	15.54
Spring 1992	44.54	12.39	42.08	12.79	42.77	12.89	47.49	19.55	47.10	21.67
High (n)	23		22		23		23		23	
Fall 1990	33.55	8.46	31.51	9.32	35.19	6.96	34.49	15.60	36.48	12.55
Spring 1992	49.40	9.60	45.78	6.60	50.53	9.65	51.59	12.42	55.61	12.34

Note: A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on repeated measures procedures comparing first-round scores with fourth-round scores for achievement. Independent variables were racial/ethnic status and social status.

[b] On a scale of 8 through 66 points, the following categories were assigned for social status: Low = 1 through 30 points; Medium = 31 through 50 points; High = 51 through 66 points.

Table 5.1 (continued)

First and Fourth-Round Achievement Scores[a] on the Iowa Tests of Basic Skills for Racial/Ethnic Status and Social Status[b]

	Mathematics Concepts		Mathematics Problem Solving		Reading Comprehension		Science		Social Studies	
	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)
Caucasian										
Low (n)	24		24		23		20		22	
Fall 1990	38.22	3.21	38.22	3.55	40.58	5.30	52.20	6.85	37.43	6.77
Spring 1992	59.94	4.06	56.09	3.65	58.09	5.78	66.03	6.94	65.57	7.32
Medium (n)	91		91		84		79		80	
Fall 1990	40.14	8.59	40.66	8.24	44.63	13.98	45.94	17.77	47.56	17.92
Spring 1992	57.05	15.52	53.74	13.67	57.67	13.07	65.98	19.11	66.92	19.02
High (n)	84		84		83		78		77	
Fall 1990	35.70	8.03	37.36	9.23	41.64	12.45	43.34	16.30	42.81	18.12
Spring 1992	56.08	14.75	53.08	9.88	55.57	11.49	65.54	12.85	65.59	15.82

Note: A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on repeated measures procedures comparing first-round scores with fourth-round scores for achievement. Independent variables were racial/ethnic status and social status.

[b] On a scale of 8 through 66 points, the following categories were assigned for social status: Low = 1 through 30 points; Medium = 31 through 50 points; High = 51 through 66 points.

Appendix K

Results of Follow-up Analyses for Repeated Measures on Second and Third Round Scores Depicting Differences in Racial/Ethnic Status and Social Status for the Achievement of Gifted Students From Four Program Types

In order to examine the relation between social status and racial/ethnic status on achievement, follow-up analyses were conducted. A mixed factorial design was used employing a three-factor ANOVA (social status x racial/ethnic status x test administration) with repeated measures on the last dimension. This design tested changes in achievement levels from the spring of 1991 to the fall of 1991. Social status (low, medium, and high) and racial/ethnic status (African-American and Caucasian) served as the independent variables. Each subscale of the ITBS was used as a dependent variable for the five ANOVA procedures. Social status as calculated by the Hollingshead Four-Factor Index (1975) produces values on a scale of 8 through 66 points. The following categories were assigned to create three groups for social status: low = 1 through 30 points; medium = 31 through 50 points; Group 3 high = 51 through 66 points.

The following research question was asked in order to investigate this set of analyses: During the summer break (spring 1991 to fall 1991), is there a difference between the achievement scores of African-American and Caucasian gifted students with respect to social status (low, medium, and high)?

Results indicated that there were no significant main effects for social status between the three categories of low, medium, and high across all levels of achievement ($p < .05$). The main effects for racial/ethnic status have already been reported (see results beginning on p. 52 of this document). There were no significant interactions between racial/ethnic status and social status across Mathematics Concepts, Mathematics Problem Solving, Reading Comprehension, and Science achievement subscales ($p < .05$). There was a significant interaction between racial/ethnic status and social status for Social Studies ($F = 3.13$, $df = 2, 245$, $p < .05$). Mean values for all student responses are located in Table 6.1. These results indicated that after the summer break, student scores in achievement did not differ significantly across the three categories of social status whether they were those of African-Americans or Caucasians, except for the subscale of Social Studies.

Graphs of the interactions for scores on the Social Studies subscale are presented in Figures 6 and 7. They depict the same mean values grouped in two different ways. Figure 6 indicates the differences in means from the spring of 1991 to the fall of 1991 for each racial/ethnic group (African-American and Caucasian) and each category of social status (low, medium, and high). Figure 7 provides information about each category of social status for each racial/ethnic group from the spring of 1991 to the fall of 1991. Student-Newman-Keuls follow-up procedures indicated that the only significant difference between means was found for African-Americans from the middle social status category. This comparison is located in Figure 6. Achievement in Social Studies decreased significantly for these students over the summer break. The graphs also depict the significant difference in achievement between African-American and Caucasian students which has already been described in Chapter 4. The scores for African-American students tend to be lower than those for Caucasians and scores from the latter group decrease after the summer break.

Table 6.1

Second and Third-Round Achievement Scores[a] on the Iowa Tests of Basic Skills for Racial/Ethnic Status and Social Status[b]

	Mathematics Concepts		Mathematics Problem Solving		Reading Comprehension		Science		Social Studies	
	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)
African-American										
Low (n)	14		14		15		13		14	
Spring 1991	41.46	3.20	38.87	4.43	39.22	7.89	46.06	8.40	50.71	6.97
Fall 1991	40.36	4.43	42.14	6.77	44.47	10.47	46.98	6.04	47.14	7.46
Medium (n)	45		45		45		44		45	
Spring 1991	39.43	9.60	36.56	11.21	35.26	11.04	38.80	16.61	48.48	18.57
Fall 1991	39.50	9.46	37.94	12.13	36.84	15.11	42.62	15.87	37.46	20.54
High (n)	22		22		22		22		22	
Spring 1991	40.47	9.69	39.55	9.16	40.11	7.91	41.35	11.86	56.00	11.58
Fall 1991	41.44	11.24	41.96	10.00	44.40	10.67	48.41	10.13	45.29	12.76

Note: A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on repeated measures procedures comparing second-round scores with third-round scores for achievement. Independent variables were racial/ethnic status and social status.

[b] On a scale of 8 through 66 points, the following categories were assigned for social status: Low = 1 through 30 points; Medium = 31 through 50 points; High = 51 through 66 points.

Table 6.1 (continued)

Second and Third-Round Achievement Scores[a] on the Iowa Tests of Basic Skills for Racial/Ethnic Status and Social Status[b]

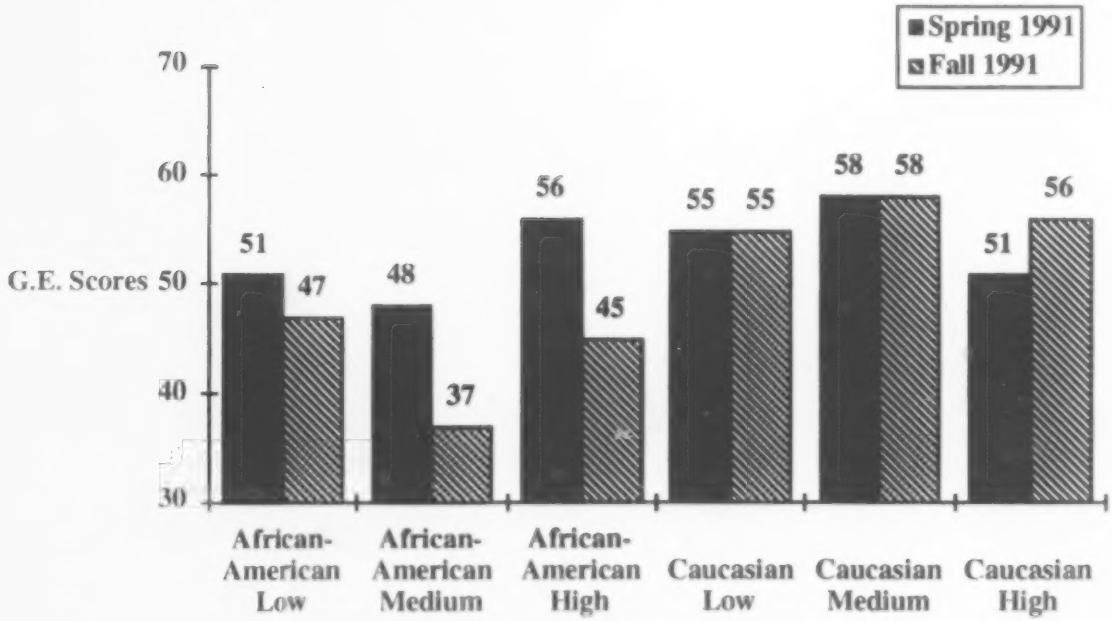
	Mathematics Concepts		Mathematics Problem Solving		Reading Comprehension		Science		Social Studies	
	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)
Caucasian										
Low (n)	26		24		27		23		24	
Spring 1991	46.59	8.95	44.97	8.69	46.69	7.39	49.19	12.09	55.03	14.43
Fall 1991	46.63	10.26	51.99	8.22	56.44	15.89	55.42	9.42	54.84	8.43
Medium (n)	90		88		91		81		85	
Spring 1991	46.99	10.51	44.87	8.88	50.26	9.31	55.33	15.64	57.95	17.10
Fall 1991	46.75	11.74	50.16	10.07	54.65	11.87	60.44	16.06	57.59	17.33
High (n)	81		80		81		76		79	
Spring 1991	44.80	11.16	42.82	10.13	46.46	13.48	50.43	16.03	50.74	19.00
Fall 1991	47.94	10.15	46.60	10.40	52.51	12.79	58.70	15.54	55.60	15.60

Note: A grade equivalent score of 29.60 refers to the second year, ninth month (May) of school.

[a] Values are based on repeated measures procedures comparing second-round scores with third-round scores for achievement. Independent variables were racial/ethnic status and social status.

[b] On a scale of 8 through 66 points, the following categories were assigned for social status: Low = 1 through 30 points; Medium = 31 through 50 points; High = 51 through 66 points.

Figure 6: Social Studies Grade Equivalent (G.E.) Scores by Racial/Ethnic Status and Social Status for Repeated Measures of Second and Third-Round Scores.

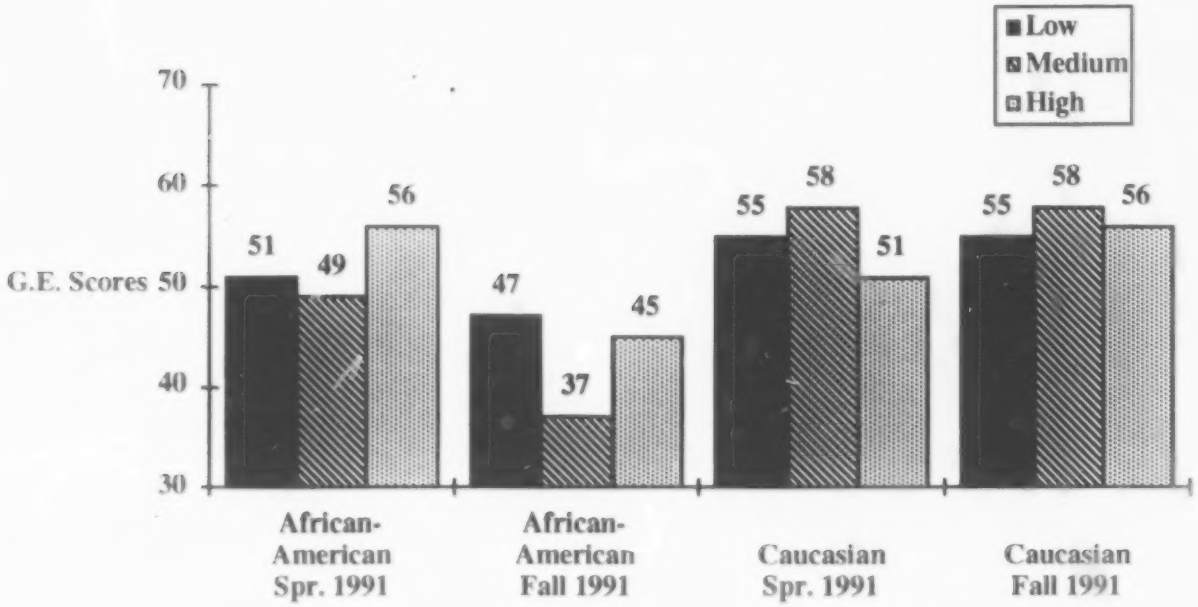


Note: A grade equivalent score of 29 refers to the second year, ninth month (May) of school.

Values are based on repeated measures procedures comparing second-round scores with third-round scores for achievement. Independent variables were racial/ethnic status and social status.

On a scale of 8 through 66 points, the following categories were assigned for social status: Low = 1 through 30 points; Medium = 31 through 50 points; High = 51 through 66 points.

Figure 7: Social Studies Grade Equivalent (G.E.) Scores by Racial/Ethnic Status and Social Status for Repeated Measures of Second and Third-Round Scores.



Note: A grade equivalent score of 29 refers to the second year, ninth month (May) of school.

Values are based on repeated measures procedures comparing second round scores with third-round scores for achievement. Independent variables were racial/ethnic status and social status.

On a scale of 8 through 66 points, the following categories were assigned for social status: Low = 1 through 30 points; Medium = 31 through 50 points; High = 51 through 66 points.

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